MALVINAS
Caja 90 / C3

MALVINAS
Caja 91 C3

ANEXO 128
Cta. Nº 562-948
Medida: 21 x 29,7 cms.
MALVINAS
Caja 91 / C3

FUERZA AEREA ARGENTINA

MEMORANDUM

Para información de:

COMANDANTE DE OPERACIONES AEREAS

PRODUCIDO POR:

JEFE DEPARTAMENTO MATERIAL

BUENOS AIRES, 2 de Julio de 1982

Asunto: Resumen de declaraciones tomadas al personal de la B.A.M.DARWIN y primeros contingentes evacuados de PTO.ARGENTINO.

Aspectos; MATERIAL PROPIO Y ENEMIGO

1. El presente informe comprende los siguientes temas:

I) Material Aéreo
II) Armamento Aéreo
III) Armamento Terrestre
IV) Defensa Antiaérea
V) Defensa Terrestre
VI) Equipos de Apoyo
VII) Equipos Individuales
VIII) Abastecimientos
IX) Otros Temas
X) Destrucción del Material

2. Cada tema, a su vez, contempla las observaciones sobre la disponibilidad, rendimiento y novedades del material propio y del enemigo.

3. Asimismo, y a efectos de facilitar su desglose, los aspectos que involucran a más de un tema fueron repetidos en cada uno de los Anexos.

4. Cabe aclarar que las observaciones incluídas en el presente informe fueron extraídas de los interrogatorios tomados, de inmediato a su arribo, en conjunto a grupos de Oficiales y Suboficiales; la información, por lo tanto, es válida como referencia, pero debe ser convalidada y ampliada posteriormente mediante interrogatorios más detallados.-

ANEXO I

MATERIAL AEREO

Aviones IA-58 - B.A.M. DARWIN

1. La pista presentó limitaciones ya que estaba siempre húmeda, muy blanda y ondulada, lo que sumado a su escasa longitud (600 mts) limitó la carga de armamento de cuatro a dos coheteras y en algunos casos a solo cañones; por otro lado y por las mismas razones se produjeron c/u 3 roturas de tren de nariz (2 en rodaje luego del aterrizaje y una en carrera de colaje, posiblemente por reventón de cubierta).

2. Los aviones no estaban equipados con soportes para JATOS, lo que podría haber minimizado las limitaciones de pista.

3. Fallas mecánicas no se observaron. En 10/15 misiones solo falló un generador.

4. Las cúpulas de cabina de los aviones IA-58 no son intercambiables, lo que dificultó la rápida puesta en servicio de un avión.usando material recuperado.

5. Se observó elevada acción de corrosión(oxidación) sobre materiales ferrosos, en particular álabes de turbinas.

6. No se presentaron novedades de radio, pese a que las mismas son frecuentes en la III Brigada.

7. En la B.A.M. no se dispuso de tractores ni equipos de arrastre para movilizar aviones y equipos de apoyo.

8. Este hecho y las condiciones del terreno, además de la falta de equipos de apoyo en cantidad suficiente, determinaron la imposibilidad de dispersar aviones y equipos, facilitando su destrucción en tierra por el ENO.

9. No se construyeron refugios o parapetos para aviones por falta de medios para mover grandes volúmenes de tierra.

10. Tampoco pudieron ser enmascarados ya que no se dispuso de vegetación ni redes con soportes adecuados.Los disponible eran de engorroso quitado y ésto determinó que no se emplearan.

11. En relación a equipos de puesta en marcha, solo se dispuso de c/u 1 en servicio precario, ya que el primero que llegó estaba F/S - El frío dificultaba su puesta en funcionamiento.

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12. Tampoco se dispuso de carros de baterías, que hubieran facilitado los arranques simultáneos y operación de aviones dispersos en el terreno.

13. No se dispuso de comunicaciones entre el personal.

14. No se dispuso de comunicaciones entre el personal técnico y armeros con el Puesto Comando para la transmisión de alarmas y órdenes. Los equipos HT con que contaba la B.A.M. no eran suficientes y en oportunidades poco efectivos(reducido alcance).Esto determinó que hubiera que distraer personal de mantenimiento para observar y avisar sobre posibles ataques mientras el resto trabajaba.

15. En el aspecto operativo del avión IA-58, los pilotos manifestaron una gran vulnerabilidad del avión a la artillería antiaérea, misiles SAM, barreras de fuego de armas livianas y al ataque de los aviones SEA HARRIER debido a su baja velocidad. Por tal razón al regreso de las misiones todos los aviones que volvían presentaban múltiples perforaciones.

16. Resumen de daños ocasionados por las armas enemigas sobre el IA-58:

a) Fusil 7,62: Múltiples perforaciones. La casi totalidad de los aviones regresó con impactos. Los detalles más significativos serían:

1º) impacto en alerón = fue detectado luego del aterrizaje.

2º) impactos en cúpulas = c/u 2. Produce orificios sin astillamiento general.

3º) impacto en panel de motores del tablero: dificultó la operación de los mismos.

4º) no fueron afectados cables eléctricos ni comandos por impactos en fuselaje.

b) Bombas BL-755: destruyó un avión en tierra por impacto directo y afectó a otros.

c) Bombas PG: sin mayores efectos al no haber impactos directos o muy próximos.

d) Cañones Harrier: derribaron un avión.

e) Misiles (A-A y S-A): un avión fué derribado por un misil de tipo no determinado. Otros dos, lanzados aparentemente desde tierra, no habrían hecho impacto sobre sendos IA-58.

f) En Bahía Elefante fueron destruídos en tierra c/u 6 IA-58 por golpe comando (c/u 5 con cohetes antitanque contra los motores y c/u 1 por ametralladoras)

17. Los IA-58 a su vez destruyeron por lo menos c/u 2 helicópteros en DRW. Uno de ellos en vuelo, con cañones y ametralladoras y el otro en tierra, con Cohetes (ambos estallaron)

18. Los aviones propios destruídos fueron colocados como señuelos, y, aunque Burdo dieron resultado, descargando sobre ellos el ataque ENO.

Helicópteros. BAM DRW

19. No se tomó declaración a pilotos de helicópteros.

20. El personal estimó conveniente contar en cada BAM con c/u 2 helicópteros tipo UH-1H para enlace y defensa, proveyendo movilidad aérea inmediata al sistema de seguridad terrestre.

21. El CH-47 (Chinoock) es muy útil para la implementación de las BAM y traslados masivos de personal y abastecimientos, pero muy lento y voluminoso para otros empleos.

22. En general, se hizo notar que nuestros helicópteros son sumamente ruidosos y por lo tanto detectables su movimiento a gran distancia.

Helicópteros de Ejército:

23. Se estima que no fueron correctamente empleados, ya que se habría observado lo siguiente:

a) Actuaron casi siempre en grupos, de día, volando encolumnados.

b) Prácticamente no actuaron de noche.

c) En general utilizaban la ruta más directa, desconociendo las capacidades del ENO en la zona y aún las características operacionales de los Harrier.

d)disponían de una sola tabla de frecuencia para todo el mes, la que llevaban consigo en cada aparato, facilitando la inteligencia del ENO en caso de captura.

MATERIAL AEREO ENEMIGO

Aviones Harrier/ Sea Harrier

24.Evidenciaban una extrema maniobrabilidad a bajas alturas.

25.Habrían sido observados aviones estacionados junto a una estancia. Los mismos habrían estado dentro de hangares inflables, camuflados (uno para cada avión). Normalmente desinflados, se inflaron para extraer el avión,el cual luego decoló verticalmente.

Helicópteros

26.Tipos Sea King (SK), Wessex (W), Sea Linx (SL), Gazelle (G) y Chinoock (CH).

27.Fueron usados intensivamente, casi siempre de noche y sin limitaciones aparentemente de visibilidad, lo cual hace presumir el empleo de visores nocturnos (intemsificadores de luz residual e infrarojos, dado que se observaron helicópteros volando a muy baja altura sobre terreno ondulado, con niebla, cielo invisible y visibilidad horizontal inferior a 100 mts).

28.En general, el empleo observado habría sido el siguiente:

CH: traslados de carga y personal.

SK: ídem, antibuques y antisubmarinos

W: antisubmarino y radiogonometría

SL: radiogonometría y ataque A-S

G: patrullaje y ataque con COH

29.No se aclaró que tipo era el usado para control de las tropas en ataque terrestre. Los mismos se asomaban y desaparecían de inmediato detrás de cubiertas del terreno.

30. Se observó W y SL con antenas de radiogoniometría en proa, trabajando de a dos. Su reacción era casi instantánea sobre todo tipo de transmisiones con equipos terrestres.

31. Fueron vistos G volando con c/u 4 infantes con equipo completo sentados en los esquíes.

32. Se observó un helicóptero con ametralladora MAG, de tiro lateral desde la puerta.

33. En el interior de un SK se observó un binocular giroestabilizado para vigilancia y designación de blancos (ver apéndice 1) colgado del parante.

34. El empleo de helicópteros era sumamente intenso de noche. Las cargas eran transportadas en redes, colgando. Eran descolgadas sin aterrizaje.

35. Los relevos de tripulación eran rápidos, sin detener motores.

36. De día, el grueso de helicópteros permanecían estacionados en zonas a cubierto (en particular entre las alturas próximas al frigorífico, en San Carlos, cubiertos por barreras de Blow Pipe).

37. Llamó mucho la atención el poco ruido que producían ya que solo podían ser escuchados a menos de 300 mts, mientras los Bell y Chinook propios, en particular en la puesta en marcha, eran escuchados a casi 20 Km.

Aviones C-130

38. Fueron observados, luego de la caída de Puerto Argentino, c/u 3 aviones lanzando bultos relativamente pequeños y aparentemente sin limitaciones de viento.

39. Se observó una probe de reabastecimiento en vuelo ubicada sobre la cabina de la tripulación, en la proa.

40. Aparentemente, estos aviones tenían insignias norteamericanas.

ANEXO II

ARMAMENTO AEREO PROPIO (DARWIN)

1°)- Coheteras IA-238/LAU-61: Fueron empleadas intensamente, no registrándose novedades en los lanzamientos. El empleo de cohetes fue preferido respecto al de las bombas PG y NAPALM ya que con aquellos se evitaba el pasaje sobre posiciones muy defendidas. También se utilizaron como armamento improvisado en tierra, desde afustes precarios y accionadas con las baterías recuperadas de los aviones destruídos, empleandolas en conjunto (cohetera completa) o individualmente (tubos solos.

- Se mencionó que, al efectuarse un lanzamiento de cohetes sobre un islote, se originó un incendio que ardió aproximadamente durante diez días.

- Los contactos de las coheteras se oxidaban con facilidad, debiendo ser esmerilados y lubricados constantemente.

2°)- Bombas Napalm. Se habrían empleado solo una vez desconociendo el resultado. En general no se emplearon debido a que el procedimiento operativo para su lanzamiento exponía excesivamente al avión, al tener que volar a baja velocidad sobre posiciones muy defendidas.

3°)- Bomba PG-125 KGS.No se emplearon en combate, pero sí se utilizaron para construir minas de circunstancias,colocandolas en el suelo o semienterrándolas de cola, con un pan de TNT en el lugar de la espoleta, un detonador N°8,cable y un explosor para su accionamiento a distancia.

4°)- Cañones y Ametralladoras IA-58: Se destruyó un SK en vuelo (estalló). También fueron empleados en tierra como armamento de circunstancia, accionados eléctricamente con las baterías rescatadas de los aviones destruídos.

ARMAMENTO AEREO-ENEMIGO

5°) Bombas BL-755, Tipo Cluster: Antipersonales y antitanques. Los daños causados no fueron considerables, pero principalmente debido a que algunas no estallaron por lanzamientos a muy baja altura (sin tiempo para armado de la espoleta), o directamente erraron al blanco. Una de ellas destruyó un IA-58 por impacto directo en tierra, en DARWIN matando al piloto y varios armeross No habrían otras bajas por este material (Ver Apéndice [illegible]).

-Las bombas fueron recogidas por personal de Fuerza Aérea y ARA y arrojadas al mar.

6°) Bombas MK-17, 1000 Lbs, trayectoría retardada

Estas fueron lanzadas grandes cantidades, sin embargo, los daños y bajas causadas, pese a su gran potencia, habrían sido mínimos. Algunas no estallaron por lanzamientos a muy baja altura. Las restantes habrían hecho impactos lejos de los blancos (aviones y tropa).

-Fueron empleadas con y sin paracaídas, con espoletas instantáneas y otras de gran retardo para interdicción (12,24 y 72 horas aparentemente, aunque una habría estallado a las 26 hs).

-También se emplearon con espoleta de proximidad. Una de éstashabría afectado a una pieza de 35 mm. Otras fueron vistas estallar aparentemente a alturas excesivamente elevadas, sin causar daños.

-Pese a la gran cantidad de bombas lanzadas sobre la pista de Pto Argentino, ésta no fué destruída.

- Las muertes de Fuerza Aérea producidas por estas bombas sólo llegarían a C/U. 4 (uno por impacto directo y tres por espoleta de retardo).

7°) Misil AS-11: Habría sido empleado contra las posiciones de radar y/o puesto Comando, en Puerto Argentino desde helicópteros, haciendo impacto en la proximidad (C/U.1) y en el agua (C/U.1). también se habrían empleado contra el Sobral.

8°) Misil Antiradar Schricke AGM-45-A-2: Habría sido empleado desde los Vulcan y también desde otro medio operando desde la isla o proximidades (Harrier-helicóptero o lanzador terrestre), dado que se vieron contenedores de misil con dicha inscripción en el transporte Nortland. (Apéndice 3).

9°) Cargas Antisubmarinas: Fueron vistas lanzadas desde helicópteros, en el canal San Carlos, a la altura de DARWIN, luego de la caída de ésta.

ANEXO III

ARMAMENTO TERRESTRE - PROPIO

1. No se habrían registrado fallas en el armamento portátil.

2. No se contó con elementos de limpieza y lubricación del armamento.

3. No se proveyeron armas largas (FAL o Pistolas ametralladoras) para el siguiente personal de la BAM DRW: pilotos, Escuadrón Técnico, Servicios del Escuadrón Base, Artillería Antiaérea y Puesto Comando - Dicho personal poseía solo pistolas, las cuales resultan totalmente ineficaces en combate abierto.

4. Miras nocturnas para FAL: se dispuso de c/u 15 por parte del GOE. Se desconocen resultados.

5. Visores Nocturnos Binoculares: Se dispuso de c/u 3 en DRW Ver Anexo V.

ARMAMENTO TERRESTRE - ENEMIGO

1. En general utilizó el siguiente;

   a) Fusil LlAl, cal. 7,62 mm. (similar FAL): Para tropa y algunos cuadros (Apéndice 5). Dotación de munición: superior a 210 cartuchos, c/u 30 de ellos TL.

   b) Fusil Sterling AR18, cal. 5,56: fue encontrado en un equipo de Control aéreo u observadores adelantados (Apéndice 6).

   c) Pistola ametralladora Sterling, cal. 9 mm.: utilizada en general por los cuadros.
   - Se observó un considerable número de ellas con silenciador incorporado, posiblemente empleadas en ataque nocturno a posiciones adelantadas propias y golpes de mano (Apéndice 7).

   d) Pistolas: Ni cuadros ni tropa poseían. Solo se las vió en algunos custodios de prisioneros, en el buque.

   e) Cuchillo de combate: era llevado en el pecho, debajo de la garibaldina.

   f) Fusil L42Al, cal. 7,62: Utilizado por los francotiradores (Apéndice 8).

   g) Miras telescópicas TRIJUX: Todos los fusiles LlAl la poseían incorporada. Es idéntica a las que dispone la FAA a razón de 7 á 8 por Unidad. Posee 4 aumentos y buena luminosidad, para zonas con muy pocas iluminación pero no es apropiadamente una mira de visión nocturna (Apéndice 9).

h) Visor nocturno: Cada hombre portaba uno del tipo monocular, colgado al cinto en estuche durante el día y colgado al cuello a la noche (parecido al indicado en Apéndice 10). A su vez, cada Jefe de pelotón poseía uno del tipo binocular. Todos con luz IR para lectura a corta distancia (Apéndice 11).

i) Granadas de mano: Cada hombre portaba una granada ofensiva y una de humo. Ambas colgadas en el correaje suspensor entre el pecho (Apéndice 12 y 13)

j) Lanzagranada de fusil: Sólo se habrían observado en c/u 2 OCAA capturados, con 6 granadas cada uno (Fusiles cal. 5,56).

k) Lanzacohetes antitanque descartables M72A1 y M72A2 cal. 66 mm.: junto con los morteros de 51 mm. constituyeron la artillería de apoyo en el ataque a DRW. C/u 2 á 4 hombres de c/equipo (9 Hombres c/u) llevaban estos lanzacohetes, haciendo uso intensivo de los mismos en el ataque. Se emplearon contra los IA-58 en golpe de mano en Bahía Elefante, destruyendo c/u 5 aviones. En DRW estalló uno a 1 metro de un oficial, tirándolo al suelo sin herirlo. Un impacto directo en una posición mató a dos soldados de la B.A.M. , los que fueron hallados sentados, como dormidos, sin heridas visibles (Apéndice 14).

l) Mortero 51 mm.: Eran portados por varios hombres por pelotón en el ataque. Cada uno llevaba un tubo cañón y c/u 4 proyectiles en la espalda, además de otros c/u 4 proyectiles en valijines. El reglaje del tiro era realizado por el Jefe de pelotón y sobre él tiraba el resto de los morteros. (Apéndice 15).

ll) Mortero 81 mm: Habrían sido empleados con espoleta de proximidad dado que muchas veces las explosiones se producían en el aire, provocando heridas por esquirlar en cabeza y dorso del cuerpo (APéndice 16).

m) Ametralladora L7A2 (Tipo MAG) cal. 7,62 mm: Cada pelotón (9 hombres) dividido en 3 equipos (3 Hombres c/u) habrían llevado c/u 2 L7A2 (una en cada equipo de combate laterales). Muchos hombres llevaban bandas de 7,62 mm. cruzadas. Se estima que serían solo los otros dos sirvientes de cada equipo (Apéndice 17).

n) Fusil ametrallador L4A4 (equivalente al FAP), cal. 7,62mm: Es posible que se haya empleado complementando a las L7A2 No fue visto tanto como éstas (Apéndice 18)

ñ) Cañón 105 mm.: Fueron vistos c/u 2 en San Carlos, remolcados por semiorugas. No fueron empleados en DRW. Son helitransportables (Apéndice 19).

o) Lanzabengalas: Con pistola cal. 38 mm. Se hizo un uso intensivo de las mismas para comando y control mediante colores (que indicaban detención, avances y retirada o simple iluminación blanca) (Apéndice 20).

p) Radar de apoyo táctico ZB-298: para detección de todo tipo de desplazamientos, incluso de personal, hasta distancias de veinte Kms. Se desconoce en que proporción fueron empleados, pero fueron vistos varios de ellos (Apéndice 21)

q) Radar detector de morteros: Tipo desconocido, se estima similar o el mismo que el anterior. Les permitía reaccionar de inmediato sobre cualquier mortero o cañón propio que disparara.

r) Computador de tiro para mortero: (Apéndice 22).

rr) Misil anti-radar Schricke, AGM 45- A-2: pudo haber sido empleado desde lanzadores terrestre ubicados en la isla, helicópteros o Harrier, ya que fueron vistos contenedores de los mismos en el buque NORTLAND que transportó prisioneros a Montevideo (Apéndice 3).

s) Misil antitanque Milán: ídem al anterior (Apéndice 23) también fueron vistos contenedores de los mismos en el NORTLAND

t) Cargas de profundidad de mano: Fueron vistas lanzadas a mano, aperiódicamente, desde todos los buques en el puerto de San Carlos, posiblemente para prevenir ataques con buzos tácticos.

u) Mira Teléscopica nocturna: La llevaban en el LLAL, los Jefes de pelotón. Se estima que habría sido la mira SCOTOS (APéndice 36).

v) Visor nocturno para vigilancia de campo y control de fuego: Similar al Tipo SS32 (Apéndice 37).

w) Telémetro lasérico: similar al LP7 (Apéndice 38).

ANEXO IV

DEFENSA ANTIAEREA-PROPIA

1°) Barreras de fuego con armas de bajo calibre: Sin efectos visibles, pero el piloto de uno de los Sea Harrier derribados tenia alojada en su pierna un proyectil 7,62.

2°) Radar DELTA: (DARWIN)

-Su funcionamiento fué satisfactorio.

-Detecto a todo móvil con velocidad superior a 180 Km/h.

-Permite la detección de helicópteros, incluso en tierra por el movimiento de las palas.

-No fué afectado por chaff.

-Tiene limitaciones cuando el viento supera los 20 Km.

-Fué destruído por impactos de FAL/Mortero.

-Es conveniente disponer de un generador de 24 v. 100 Amp. para facilitar su empleo.

3°) Skyguard y cañones 35 mm. (Ejército en DARWIN)

-Sumamente efectivo contra ataques aéreos cuando funciona el sistema completo (radar-baterías).

-No fué afectado por el viento.

-Fué afectado por el chaff lanzador por cohetes desde avión. Se desconoce el estado del MTI en ese momento.

-Consumo estimado: 40 proyectiles por avión atacante por pieza.

-Muy efectivo en tiro a objetivos terrestres.

-Derribos confirmados C/U.2; sin confirmar: C/U. 1.

-No detecto helicópteros por su baja velocidad.

4°) Superfledermaus y cañones 35 mm. de Fuerza Aérea en Puerto Argentino:

-Surgieron problemas en la central de tiro debido a que el sincro de azimut tenía los engranajes gastados; los enviados como repuesto no eran los correspondientes.Fueron adaptados pero nuevamente se rompió el eje del sincro. A partir de este momento se tiro en forma manual.

-Se recibió otra central y un cañón (para reemplazar uno destruído por esquirlas).

-La central recibida no pudo ser utilizada porque quedó F/S al ser chocada en el desembarco. De la misma se sacaron los repuestos necesarios para la otra central.

-Luego de solucionados los inconvenientes menconados surgió otra novedad en la entrada de la señal de azimut al computador por lo que se tuvo que tirar con el sistema alternativo (manual).

-La efectividad del mismo es difícil de determinar por la cantidad de Aa.Aa. existente en la zona (Ejército tenía 6 directores de tiro Skyguard con 12 cañones 35 mm).

5°) SAM 7 (DARWIN):

-Se lanzaron C/U.3 con los siguientes resultados:
-C/U.1 impactó en un cerro al frente y se desvió hacia arriba estallando en altura. El avión había pasado y estaba ya detrás del cerro.

-C/U.1 falló lanzamiento (se cayó hacia atrás al levantarlo en excesivo ángulo (60°).

-C/U. 1 tuvo trayectoria errática.

-Está limitado al ángulo máximo de lanzamiento dado que se cae hacia atrás inutilizándose. Por lo tanto debe ubicarse a los lanzadores en los puntos más elevados del terreno.

-El personal debe ser capacitado adecuadamente, no puede improvisarse.

-No debe transportarse fuera de los cajones contenedores ya que el manipuleo los deteriora (quedaron C/U.2 F/S.).

-Debido a la escasa cantidad de misiles disponibles los mismos eran continuamente trasladados hacia las distintas posibles rutas de aproximación, resultando deteriorado el material y muchas veces no se pudo emplear por encontrarse en posición distinta a la empleada por el ENO.

6°) SAM 7 (Bahía FOX):

-Se lanzó C/U.1, el cual salió 30 segundos después de oprimido el disparador, sin dirección, rebotó 3 veces y estalló. Se estima por bajo rendimiento o descarga de la batería térmica (algunos tenían fecha última revisión 1977).

-En Puerto Argentino, un POA habría derribado a un Harrier volando rasante. El piloto se eyectó.

7°) -Roland, de Ejército, en Pto. Argentino: El mismo se descalibra con facilidad ante el pasaje de aviones razante e impactos de bombas y de artillería en su proximidad.

-Se derribó un Sea Harrier, desconociéndose cantidad de lanzamientos realizados.

-La técnica empleada habría sido reducir la potencia del radar momentáneamente a efectos que los aviones, con alarma radar, se aproximaran y entraran en distancia de tiro sin acciones evasivas ni contra-medidas eléctronicas pasivas. Similar procedimeinto se utilizaba con el sistema Skyguard-35 mm.

8°) -Tiger Cat, de Ejército, en Pto Argentino: Habría demostrado muy escasa eficacia. Se observaron solo dos disparos, ambos aparentemente con trayectória errática.

9°) Radar Westinghouse: Excelente rendimiento. (Pto. Argentino).

10°) Cañón RH 202: (DARWIN)

-Muy buen resultado.

-Confirmados: 2 derribos Sea Harrier.

-Artilleros: Algunos artilleros tenían muy escasa instrucción, habiéndola recibido solo algunos días antes de ser embarcados, siendo en general, músicos de la IX Brigada; en algunos casos no reaccionaban adecuadamente ante los ataques aéreos.

-Es conveniente proveerles a los artilleros algún tipo de defensa personal (cascos con equipos de comunicaciones integrado, chaleco antibalas y/o blindajes).

Consumo promedio: 30 proyectiles por av ión por pieza (1 ráfaga).

-El ataque desde el sol dificultaba considerablemente la puntería.

-El frío dificultaba el arranque de los motores, produciéndose esfuerzos y desgastes excesivos en las sogas de arranque. Deben proveerse repuestos o material más robusto.

-C/U. 2 piezas habrían sido destruídas por el fuego de mortero del ENO.

11°) Ametralladoras 12,70 M-3

-No se observaron defectos.

12°) Ametralladoras 7,62 MAG/FAL:

-Un piloto fué herido en la pierna por un disparo. El avión enfrentaba al tirador.

-Luego de determinado por parte del enemigo nuestra capacidades relativas a defensa antiaérea, los lanzamientos en general fueron realizados entre 7.000 y 8.000 mts. es decir fuera del alcance de los cañones de 20 - 35 mm. y misiles superficie -aiere Roland.

13°) Red de enmascaramiento: Las redes de enmascaramientos presentaron las siguientes dificultades:

-Los colores no eran adecuados a la topografía de la zona.

-Son muy grandes: deben proveerse en distintas medidas.

-No se disponía de parantes y vientos para su instalación.

-No eran adecuadas para cubrir a los IA-58. La incomodidad para retirarlas determinó que no fueran empleadas.

-Las disponibles no fueron suficientes para cubrir todo el material disperso.

-Por ser de plástico tienen brillo.

DEFENSA ANTIAEREA ENEMIGA

14°) Misil S-A, individual, Blow-Pipe (BP):Habría sido empleado intensamente. Las posiciones de la cabeza de plaza de San Carlos fueron rodeadas con los mismos en los 360°, ubicados en lo posible en las zonas altas. La munición era entregada periódicamente en cada posición mediante semi orugas.

-Aparentemente dos de ellos, lanzados sobre IA-58, no habrían hecho impacto. Se desconocen otros derribos con éste material.

15°) Misil S-A en baterías, RAPIER: Se desconoce el resultado de su empleo.

-Posterior a la caída de Puerto Argentino se observó la instalación de una batería de RAPIER.

16°) Misil S-A de buques: Fueron utilizadas C/U 2 fragatas ubicadas en proximidades de la costa para cerrar las defensas de posiciones costeras en los 360°. El resto del cuadro era cubierto por Blow-Pipe (Ejemplo, ver Apéndice).

-Aparentemente, de una de ellas partió el misil que derribó al Lear Jet. Se desconoce el tipo empleado.

17°) Artillería Antiaérea: No se observó

18°) Fuego de fusilería: Habría sido intensamente empleado, en particular contra IA-58 y Machi, produciendo daños diversos pero desconociéndose si causaron algún derribo.

19°) Radar Móvil: Fué emplazado a la entrada de San Carlos y permaneció enmascarado. El tipo observado sería muy parecido al que figura en Apendice.

20°) Como medio complementario a la defensa antiaérea, y a efectos de desanimar el empleo de la aviación propia sobre sus objetivos más importantes, el ENO colocó a los prisioneros en medio de depósitos de municiones (Frigorífico San Carlos), o instaló sus puestos de comando y centrales de comunicaciones en el interior de poblaciones civiles (pueblo de San Carlos) (Ver Apéndices

ANEXO V

DEFENSA TERRESTRE - PROPIA

1. Cañones 35 mm Oerlikon y 20 mm RH 202:

   - Demostraron ser sumamente efectivos, en particular el de 35 mm.

2. Minas antitanques (AT) y antipersonales (AP):

   - Fueron instalados por Ejército ya que la propia tropa no tenía adiestramiento al efecto.

   - Ante la eventualidad de que el ENO no empleara blindados, fueron colocados una AP al lado de cada AT.

   - Las minas de Ejército no fueron instaladas (c/u 800 aprox.) pues habrían sido provistas sin detonadores.

   - Algunas minas explotaban al ser pisadas por gansos y ovejas (posible acción del ENO).

   - Al cambiar las posiciones y adelantarse Ejército, el campo de minas fue desactivado.

3. Granadas de fusil tipo STRIM:

   - Se lanzaron c/u 50 aprox. No se apreciaron los resultados. Funcionamiento S/N.

4. Granadas de mano

   - No se usaron debido a que el avance ENO se detuvo fuera de su alcance.

5. FAL, FAP, MAG, Pistolas Ametralladoras: no se informaron novedades.

6. Faltó Trotyl para construcción de refugios en la piedra. Tampoco se dispuso de cantidad suficiente de iniciadores, cables y explosores.

7. Pozos de zorro y cubiertas:

   - Fue sumamente difícil construírlos ya que solo se disponía de c/u 5 picos y debajo de la capa orgánica que cubre el suelo solo había piedra (se citó como ejemplo que para construír 4 tumbas se tardaron casi 6 días).

- El agua brotaba por el fondo de cada pozo. Para evitar que los pies se mojaran, se colocaba heno en el piso, el cual era cambiado periódicamente.

- Se insistió en la necesidad de contar con perforadoras neumáticas y palas mecánicas para movimiento de tierras, cavado de pozos, parapetos, cubiertas, depósitos, tumbas, etc.

8. Cubiertas para aviones y material: (DRW)

- La falta de medios idóneos determinó que no se pudiera construírlas.

- Un pequeño mamelón alrededor de un IA-58 lo protegió de mayores daños.

- Resultan imprescindibles para, por lo menos, servir de refugio al personal de mantenimiento que atiende los aviones.

9. Comunicaciones:

- Los equipos HT disponibles en DRW eran escasos y de poco alcance.

- Son incómodos y fáciles de interferir.

- Ante la falta de elementos de comunicación entre las posiciones de la defensa, para enlace y control se debió recurrir a hilos atados al dedo de cada soldado en su respectivo pozo de zorro.

10. Bengalas:

- Son imprescindibles en combate nocturno, ya sean lanzadas con mortero, FAL o escopetas especiales.

- Estas últimas, (se disponía de solo dos escopetas de 38,1 mm) alcanzaban poca altura, su permanencia en el aire era muy corta y, en general, iluminaban al lanzador.

- Las bengalas del equipo de supervivencia originan confusiones respecto a las verdaderas distancias entre el lanzador y sus equipos de búsqueda. Tal circunstancia debe ser aclarada a efectos de evitar que la búsqueda sea infrustuasa.

11. Visores nocturnos:

- Solo se dispuso de c/u 3 en DRW.

- Estos, del tipo binoculares intensificadores de luz, permiten buena visibilidad e incluso detectar siluetas de helicópteros volando a varios kilómetros pero su alcance es reducido al no permitir detectar hombres a más de 150 metros; para defensa terrestre deben ser suplementados por otro equipo de mayor alcance.

12. Armamento de circunstancias:

- Coheteras tipo LAU 2,75 " de aviones IA-58: fueron empleadas como lanzacohetes terrestres, apoyadas y amarradas a afustes de circunstancias (tinglados, tractores, alambrados), accionadas eléctricamente. Excelente resultado. Se estima causaron considerables bajas al ENO en su avance, batiendo zonas.

- Tubos simples de coheteras 2,75": se habrían usado lanzando desde el hombro. Exige buen apoyo del tirador.

- Bombas PG-125 Kgs: enterradas de cola o apoyadas en el suelo, a modo de minas, con pan de trotyl en el orificio de la espoleta, detonador Nº 8, cable y accionadas a distancia por un explosor.

- Ametralladoras y cañones de avión IA-58: sobre afustes de circunstancias, con accionamiento eléctrico.

13. No se dispuso de armas largas para defensa terrestre, directa, de las posiciones de artillería antiaérea.

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14. En DRW se dispuso de c/u 2 morteros de 81 mm de la EAM, uno de los cuales fue facilitado a Ejército.

15. Ejército: además dispuso de c/u 2/4 cañones de 105 mm, c/u 1 mortero de 120 mm y c/u 2 cañones sin retroceso de 90 mm, todos sin sus respectivos aparatos de puntería, los que habrían quedado en el continente - c/u 2 de los cañones de 105 fueron rescatados debajo del agua y armados por personal de FAA y Ejército.

ANEXO VI

EQUIPOS DE APOYO - PROPIOS (DARWIN)

1°)- Entre los elementos indispensables conque debe contar una BAM para desarrollar operaciones con un apropiado grado de efectividad es necesario contar con los siguientes:

- Excavadora.
- Pala mecánica.
- Martillo neumático
- Picos y palas de mano en cantidades suficientes.
- Tractores con reudas adecuadas (No se dispuso de tractores ni de vehículos para arrastre de aviones, lo que trajo aparejada una gran limitación en la posibilidad de dispersión de material).
- Jeep / Unimog.
- Motos todo terreno para enlaces rápidos.

2°) - El citroen (Meharris) para lucha contra incendio fué provisto con el motor fuera de servicio (solo un pistón funcionaba). No pudo ser puesto en marcha. Por otro lado no es apto para todo terreno ni tiene capacidad para combatir fuegos como los provocados por ataques aéreos contra aviones y/o materiales.

3°) - El sampimóvil resultó no apto para terreno blandos por contar con ruedas muy angostas.

4°) - Equipos de puesta en marcha avión IA-58 (Hobarts):

- Fueron insuficientes (C/U.1).
- Presentaron inconvenientes en su puesta en marcha por las bajas temperaturas reinantes.
- Son muy pesados para arrastre sin medios adecuados.

5°) - La falta de medios de arrastre ó grúas adecuadas para retirar a un avión dañado en medio de la pista, determinó que otros fueran destruídos en tierra por el enemigo, al ser impedido su despegue oportuno por pista obstruída.

6°) - Sistema trasvasador de combustible:

- Debe adiestrarse al personal en el manejo de los tanques pillow. El personal adiestrado llegó solo dos días antes del comienzo de las operaciones.
- La trasvasadora de pillow tuvo problemas, por lo que se debieron improvisar otros sistemas de accionamientos manual y por gravedad para el trasvase, con la consiguiente pérdida de tiempo y operatividad.
- Como sistema alternativo se contó con solo dos bombas tipo reloj, lo que penalizó continuamente la operación.

7°) - Las fundas de lonas para proteger el material de las inclemencias del tiempo no fueron provistas en las cantidades necesarias.

8°) - Todos los vehículos y equipos de apoyo deben tener previstos los puntos de amarre para transporte en buques. La falta de los mismos demoró las cargas y afectó la seguridad.

9°) - Todos los vehículos deben poseer medios para disimular sus luces durante la noche. La falta de éstos elementos y de medios de señalización de caminos determinó que cada llegada de aviones C-130 a la isla se delatara por una larga columna de vehículos con luces que se movían hacia y desde el aeropuerto, y dentro del mismo.

EQUIPOS DE APOYO - ENEMIGO

10°) - El material observado habría sido, entre otros, el siguiente:

- Pala cargadora frontal 72-51 MWT (Apéndice 27)
- Camión 4 x 4 con grúa ATLAS AK 4000 L (Apéndice 28)
- Tanque con pala frontal, posiblemente CHIEFTAIN (Apéndice 29). Llamó la atención el empleo de orugas de de goma, resultando muy silencioso en su desplazamiento.
- Caminos plegables Clase 30 (Apéndice 30).
- Generador eléctrico diesel PETTER 4KVA, portátil (Apéndice 31).
- Trasvasadora de combustible portátil tipo 5020 (Apéndice 32).
- Depósitos de combustibles plegables de 1930 litros C/U. (Apéndice 33).
- Bomba remolcable SYKES Super Univac (Apéndice 34).
- Motoelevador todo terreno EAGER BEAVER (Apéndice 35)
- Señalización nocturno de caminos mediante flechas plásticas fosforesentes. Los vehículos a su vez, transitaban con luces rojas no visibles desde lejos (Apéndice 36).
- Botes a motor, para desplegamiento nocturno entre distintos puntos y golpes de mano (Apéndice 37).
- Redes para entrega de cargas por helicópteros. Gran cantidad.
- Hangar inflable, enmascarado, para Harrier.
- Semiorugas CENTAUR. fueron vistos entregando munición a puestos de Blow Pipe en el terreno, a las primeras líneas en el ataque a DRW, y remolcando todo tipo de Trailers (Apéndice 39).
- En zonas con pozos de zorro, cada tres de ellos disponían de C/U. 1 bomba manual para desagote del agua. Sin embargo, se vieron muchos pozos casi inundados.
- Scorpión, tanque liviano, en distintas versiones. (Apéndice 40).
- Sistema nocturno de señalización, sin energía (Apéndice 41).
- Bote rígido con motor. Fué intensamente empleado para enlazar entre sí posiciones próximas a la costa. (Apéndice 42).
- Cocina e iluminación de campaña: en general utilizaría sólo alimentada a Kerosene J.P.1, y no a gas.

ANEXO VII

EQUIPO INDIVIDUAL - PROPIO

1. Campera de Combate:

- No está mimetizada ni se ha previsto la forma de hacerlo.

- No es impermeable

- La campera provista con forro de lana interior resulta abrigada pero, al no ser impermeable se moja reteniendo la humedad y aumentando su peso.

- El color claro del forro interior de la capucha es fácilmente visible de noche. Debe ser verde.

- La campera de origen israelí, usada como abrigo impermeable sobre el equipo de combate, se comportó eficientemente. Además posee capucha.

2. Capa impermeable:

- Son demasiado cortas y anchas, siendo levantadas por el viento y obligando a atárselas con cuerdas a la cintura.

- Es incómoda para arrastrarse, obligando a abandonarla durante los desplazamientos de combate.

3. Camisa:

- Resulta incómoda para el movimiento y no abriga ni proteje. Se sugirió el reemplazo por una remera verde similar a la empleada por ARA, con mangas cortas y largas.

4. Pullover verde:

- No abriga suficientemente. Se sugiere reemplazo por pullover cuello alto elástizado y con refuerzos de cuero en las zonas de más desgaste.

5. Medias:

- De Algodón: se agujerean y no abrigan

- de lana grises: son mucho mejores.

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6.Borceguíes:

- los de goma, sin distinción de fecha de provisión, son fríos y húmedos. Originaron serios problemas al personal.

7.Bolsa de rancho:

- es incómoda y ruidosa. Debe reemplazarse por otra más ajustada, compacta y completa, con todos los utensillos para comer, beber e incluso cocinar, previendo que los hombres puedan verse obligados a operar o desplazarse a posiciones en las cuales no dispongan de apoyo de rancho.

- La Compañía de la EAM, en DRW, no poseía platos debido a que en la Unidad se utilizan bandejas. Por tal razón debió comer siempre en sus cascos de acero. Al caer prisioneros y serles quitados éstos, el problema fué crítico. Apesar de ser requeridos, dichos platos no les fueron enviados.

8.Chalecos antibalas:

- En DRW no fueron usados.

- En Puerto Argentino fueron empleados por los artilleros y personal de mantenimiento en pista.

9.Correajes de cuero:

- Son poco funcionales, resultando incómodos en los desplazamientos.

- Los hilos se cortaban, dejando caer los cargadores.

10.Correajes de poliamida

- Solo provistos al GOE y paracaidistas de rescate, no habrían tenido novedades.

11.Visores nocturnos

-En DRW disponían de solo c/u 3 - Se emplearon en seguridad terrestre.

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12. Anteojos de campaña:

- El material provisto de FAA era antiguo, en mal estado e ineficaz - Debieron comprar c/u 6 a los Kelpers.

13. Linternas:

- Son muy necesarias

- Las provistas no fueron suficientes. Deben preverse c/u 1 para c/hombre.

- Deben preverse medios para disimular su luz y evitar la detección enemiga.

- Deben ser resistentes al agua y al óxido.

14. Pilas para linternas, radios y equipos:

- Deben preverse la provisión, en cantidad suficiente, de pilas en sus tres tamaños.

15. Cartografía terrestre:

- En escala adecuada, es imprescindible para el reconocimiento y aprovechamiento del terreno próximo a la BAM - Debe estar actualizada y ser verificada oportunamente - Su falta puede implicar la pérdida de hombres y el no aprovechamiento de las defensas.

- Al mismo tiempo, es imprescindible instruir al personal en su empleo y reconocer el terreno para verificar si la información es completa y correcta.

16. Brújulas terrestres:

- Deben preverse su provisión y la instrucción del personal en su empleo.

17. Pomada y/o grasa

- Debe preverse para protección y mantenimiento del calzado y cueros en general.

18. Formas y colores de uniformes e insignias de grado

La diferencia entre los uniformes del personal de las distintas especialidades (pilotos, mecánicos, artilleros, GOE, Tropas, etc)y las insignias de grado cosidas y visibles, facilitó la inteligencia enemiga permitiéndole distinguir y ubicar a aquel personal que le interesó interrogar y/o retener.

ANEXO VIII

ABASTECIMIENTOS - PROPIOS

1°) Combustibles: Se debe preveer más combustibles para la AA, a razón de 600 litros por día por cada batería de 35 mm. (dos piezas) y 600 litros por pieza para cada batería de 20 mm (nueve piezas).

2°) Racionamiento: Para compensarlo se carnearon ovejas compradas a los Kelpers, pero en general manifiestan que fue satisfactorio.

- La ración "C" es muy apropiada, en particular por el chocolate. La misma es muy útil cuando se opera por corto tiempo alejados del centro de racionamiento. No es conveniente prever su empleo para lapsos prolongados. Se hizo notar que es conveniente incluir un solo sobre con café con leche y azúcar en polvo en vez de uno con cada elemento.

- No es conveniente la provisión de grandes cantidades de productos perecederos, tales como legumbres, frutas, etc. debido a:

  - El gran peso y volumen a trasladar.
  - La servidumbre que origina su conservación y cuidado.
  - El elevado porcentaje de pérdidas.
  - Inconvenientes que presentan en su preparación.

- Se estimó mucho más conveniente la provisión de alimentos mejor balanceados, no perecederos y de fácil cocción, los que a la vez tienen menor peso y volumen, facilitando el transporte y entrega.

- Por otro lado, se estima muy conveniente la provisión de caramelos vitaminizados, a base de glucosa y con inhibidos de apetito.

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ANEXO X

DESTRUCCION DE MATERIALES (DARWIN)

1°) Cañón RH 202:

- C/U. 2 destruídos por fuego de morteros.
- C/U. 4 se retiró una pieza y se arrojo al mar.

2°) ELTA:

- C/U. 1 destruído por mortero ENO.

3°) Skyguard: (Ejército)

- Generador de una pieza F/S por acción BL-755
- Director de Tiro destruído a martillazos.
- Casette incinerado.
- Carcazas al mar.

4°) Cañón 35 mm: (Ejército)

- Destruídos.

5°) Aviones:

- Todos F/S por daños irreparables ó destrucción.

MATERIAL QUE NO PUDO SER DESTRUIDO (DARWIN)

1°) Munición 20 mm RH 202. C/U. 8.000

2°) Munición 20 mm HS 804: C/U. 35.000

3°) Munición 7,62 mm: C/U. 140.000

4°) Cañón RH 202- C/U. 1 recuperado por el ENO

5°) Napalm: C/U. 50 bombas de 100 kg. llenas con reforzador colocado; C/U. 60 bombas vacias, algunas de las cuales con perforaciones de esquirlas.

6°) Compuestos A y B: Quedo la totalidad, sin manuales explicativos de empleo.

7°) Cohetes FFAR 2,75 C/U. 2.500 aproximadamente.

8°) Bombas 125 Kg. C/U. 20..

PUERTO ARGENTINO

1°) Se habría destruído sólo parte del armamento, ya que se había ordenado no hacerlo.

2°) A los vehículos se les fundió el motor haciéndolos marchar sin aceite.

3°) Radar: se colocó ácido en el circuíto refrigerante, y se destruyeron las tarjetas.

4°) Se desconocen las municiones que quedaron

MATERIAL DE EJERCITO

1°) Luego de la caída de Puerto Argentino fué observado un helicóptero Augusta de Ejército, volando. El mismo fué luego embarcado en una fragata Inglesa.

2°) También habría sido visto un Chinock en reparación.

EQUIPO INDIVIDUAL - ENEMIGO

19. Identificación de Grados, Unidades y Armas:

- Todo el personal, sin distinciones, utiliza el mismo uniforme de combate mimetizado. Los grados son individualizados por unas pequeñas tiras de tela colgadas y pivoteando del 2º botón de la garibaldina. Normalmente van escamoteadas y cubiertas por la solapa.

- En otros casos, solo se distingue al Oficial y Suboficial por una pequeña cinta roja o negra, en el mismo lugar. Ambas insignias son fácilmente desprendibles a efectos de que el portador pueda pasar desapercibido.

- Las Armas serían distinguidas por el color de la boina y las Unidades por un escudo en la misma boina. Esto dificulta la individualización y por lo tanto la inteligencia del ENO durante el combate o al caer prisionero.

20. Uniformes:

- El uniforme de combate estaría compuesto, por lo menos, por las siguientes prendas (encontradas a un equipo de OCAA capturado):

  - borceguíes
  - garochas para lluvia (se dispone de un modelo)
  - c/u 3 pares de medias
  - calzoncillo largo
  - camiseta de abrigo
  - pullover con refuerzos de cuero (Apéndice 44)
  - pasa montaña (Apéndice 44)
  - pantalón y garibaldina mimetizadas
  - forro quita y pon, para abrigo (Apéndice 45)
  - pantalón y chaqueta impermeables mimetizados (son llevados en pequeño bolso al cinto)
  - guantes y mitones
  - correaje de combate completo.

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21. Garibaldinas

- Son amplias, mimetizadas, con manchas alargadas y "desgarradas " de distintos tonos y colores. Con c/u 4 bolsillos al frente, con solapas. Sin cierres relámpago, con botores grandes y fuertes.

22. Garibaldina impermeable

- Amplias, pueden ser llevadas incluso sobre el correaje de combate; con capucha, la parte delantera superior queda levantada abrigando el cuello a modo de "peto".

23. Francotiradores

- El uniforme completo presentaba flecos colgantes a modo de enmascaramiento.

24. Guantes

- Cada hombre dispone de 3pares de guantes o mitones,para distintos usos:

  a) de día: de lana elastizada, acolchados en el dorso y nudillos, sin dedos (similares a los de conductores de automóviles).

  b) de noche:mitones con un orificio a la altura del índice, por donde puede salir el dedo índice, enfundado, para disparar el arma sin quitarse el guante.

  c) para lluvia:se coloca encima del guente un mitón impermeable.

25. Borceguíes:

- Llevan una funda impermeable que se coloca a modo de galocha o polaina, para evitar la humedad.

26. Correajes y equipos de combate:

- Casco: aparentemente de fibra de vidrio, habría sido usado solo en el ataque a DRW. En general era reemplazado, durante los desplazamientos, en guarnición y a veces incluso en el ataque, por la boina. El interior del casco es acolchado, con ventilación.

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- Correajes: de poliamida o algodón. Estaría integrado por (ver Apéndice -46-):

a) cinturón: con una sola línea de ollaos para colgar cargas.

b) correas suspensoras: dos al frente unidas por la espalda y dos tiras atrás a efectos de soportar mejor las cargas, las cuales van repartidas a los costados y a la espalda, nunca adelante para no molestar ni engancharse cuando el hombre, se arrastra o agache. En las correas delanteras, sobre el pecho llevan:

1-Estuche sanitario, conteniendo por lo menos:

a) un sachet de glucosa

b) tubo de plástico flexible con aguja para auto inyectarse

c) ampolla de morfina conectable al tubo

d) apósitos y torniquete

e) se estimó que llevan comprimidos o inyectables para cumplir las siguientes funciones:

- compensar la pérdida de sangre
- facilitar el sueño
- impedir el sueño
- compensar el cansancio
- anesteciar el dolor

Cuando un hombre es herido durante el ataque, mientras uno de los integrantes del equipo los proteje con su fuego, el tercero lo lleva hasta un lugar protegido, le inyecta la aguja conectada al estuche sanitario, llama por radio al Centro de Recuperación de heridos y continúa luego su desplazamiento.

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2 -Linterna, de plástico, 2 elementos, cabezal giratorio y a 90°, (Apéndice -47-). Tiene un filtro rojo para empleo nocturno.

3 -Granada de mano (Ofensiva) (Apéndice -12-)

4 -Granada de mano fumígena (Apéndice -13-)

5 -Algunos llevan un equipo de radio muy pequeño, con un solo auricular y micrófono o laringófono, tambien en un sobre tomado de las correas suspensoras, en el pecho.

c) del cinturón van tomadas las siguientes piezas, (siempre colocadas a los costados y atrás):

1 -c/u 2 portacargadores de fusil, (de 2 cargadores de 20 ó 30 cartuchos c/u), colocados uno a cada costado del cuerpo. Además llevan c/u 1 cargador en cada bolsillo superior delantero de la garibaldina con lo cual totalizan, contando al colocado en el arma, c/u 7 cargadores, o sea, 140 a 210 cartuchos por arma.

2 -Estuche con visor nocturno (monocular para la tropa y binocular para los Jefes de Pelotón). En desplazamientos nocturnos lo llevan colgado del cuello, debajo de la pechera de la garibaldina.

3 -Sobre con pantalón y garibaldina impermeable mimetizados. Amplios y con capucha, se colocan sobre el uniforme de combate, e incluso si es necesario, sobre el correaje.

4 -Bolsa de completamiento conteniendo:

a) bolsa de dormir muy fina, en un sobre.

b) ración de combate para dos días, la cual incluye:

-c/u 2 latas de comida con sus respectivas pastillas de alcohol (aparentemente) pegadas debajo.

- leche en polvo
- caramelos de glucosa (similares a los que van en el equipo de Supervivencia de Camberra)
- chocolate
- queso
-etcetera

c) - colchon inflable, con cubierta superior y cierre delantero con visor transparente, El hombre se introduce adentro de ella y se cubre con la bolsa de dormir(a)

5 - Cazmañola plástica, utencillos para cocinar y comer: estos van plegados integrando un solo conjunto, compacto, liviano y sin ruidos. Alrededor de la tapa va enrroscada una cuerda de 3 metros de longitud, con un nudo en un extremo y un taco de madera en el otro, a modo de manija empleada para atar, colgarse, leventar cargas, etc.

d) - Correa portafusil: se abre en dos tiras paralelas, permitiendo colgar el fusil a la espalda, verticalmente en el medio de la misma y dejando ambas manos libres.

e) - Mochila: sumamente voluminosa. Se empleó solo en los desplazamientos, no en el ataque.

Anexo IX

Otros Temas

Empleo del Material

1) Por comentarios del personal ENO con los prisioneros, se desprende que practicamente habrían desvartado el combate y movimientos diurnos, por lo cuál todo el equipamiento de combate y apoyo se adecuó al empleo nocturno. (medios de visión y puntería, de detección, mimetización, supresión de leces y ruidos en todo tipo de vehículos aéreos, terrestres y navales, etcétera).

2) Se ha dado gran importancia a la comodidad del personal en particular durante el combate (equipo completo y liviano, medios para cocinar, comer, dormir, protección adecuada contra el frío y la humedad, relevos del personal cada dos horas durante el ataque, medios para atenuar el cansancio y dolor, etc).

3) Se da gran importancia a la recuperación del muerto o herido en combate, disponiendo de un Centro de Recuperación de heridos con el cuál enlaza directamente cada Jefe de Equipos y de Pelotón por medio de un canal de su radio.

4) Se ha provisto de medios de comunicación casi hasta el mínimo escalón (equipo de combate de c/u 3 hombres), enlazando incluso al nivel pelotón con el apoyo aéreo directo.

5) Se han diseñado o adecuado todos los equipos de apoyo considerando por lo menos el traslado por modo aéreo, teniendo en cuenta particularmente las exigencias de mínimo peso y volumen a la par de la transitabilidad en todo terreno, mínimo nivel de ruidos, empleo intensivo del kerosene (JP1).

6) Se ha hecho escuela de la disciplina de fuego evitando todo consumo de munición hasta estar en distancia de tiro y aún en ella empleando solo tiro de repetición y no ametralladora Esto fué particularmente distinto a lo observado en la propia tropa, que hizo fuego en todo momento y a cualquier distancia, lo cual era incluso empleado por el ENO para ubicar nuestras posiciones.

7) El empleo de la artillería antiaérea propia tirando rasante contra la infantería había causado numerosas bajas.

8) El ENO mostró particular interés por ubicar, entre el material capturado, las bombas NAPALM, los vehículos de todo tipo y la munición cal. 7,62 mm.

APENDICES

Nº 1.- Bomba BL-755.

Nº 2.- Bomba MK-17 - 1.000 Lbs.

Nº 3.- Misil Schrickc - AGM-45.

Nº 4.- Misil AS-11.

Nº 5.- Fusil L1A1, cal. 7,62 mm.

Nº 6.- Fusil Sterling M-18, cal. 5,56 mm.

Nº 7.- Pistola amet. Sterling, cal. 9 mm.

Nº 8,- Fusil francotirador L42A1, cal. 7,62 mm.

Nº 9.- Mira de fusil Trilux.

Nº 10.- Visor nocturno - intensificador de luz - monocular.

Nº 11.- Visor nocturno - binoculares.

Nº 12.- Granadas de mano ofensivas, L2.

Nº 13.- Granadas de mano de humo.

Nº 14.- Lanzacohetes antitanque descartable M72A1 y M72A2, cal. 66 mm.

Nº 15.- Mortero individual de 51 mm.

Nº 16.- Mortero 81 mm, L16.

Nº 17.- Ametralladora L7A2, cal. 7,62 mm.

Nº 18.- Fusil ametralladoras BREN L4A4, cal. 7,62 mm.

Nº 19.- Cañón 105 mm.

Nº 20.- Pistola lanzabengalas ES80.

Nº 21.- Radar de apoyo táctico.

Nº 22.- Computador de tiro para morteros.

Nº 23.- Misil antitanque Milan.

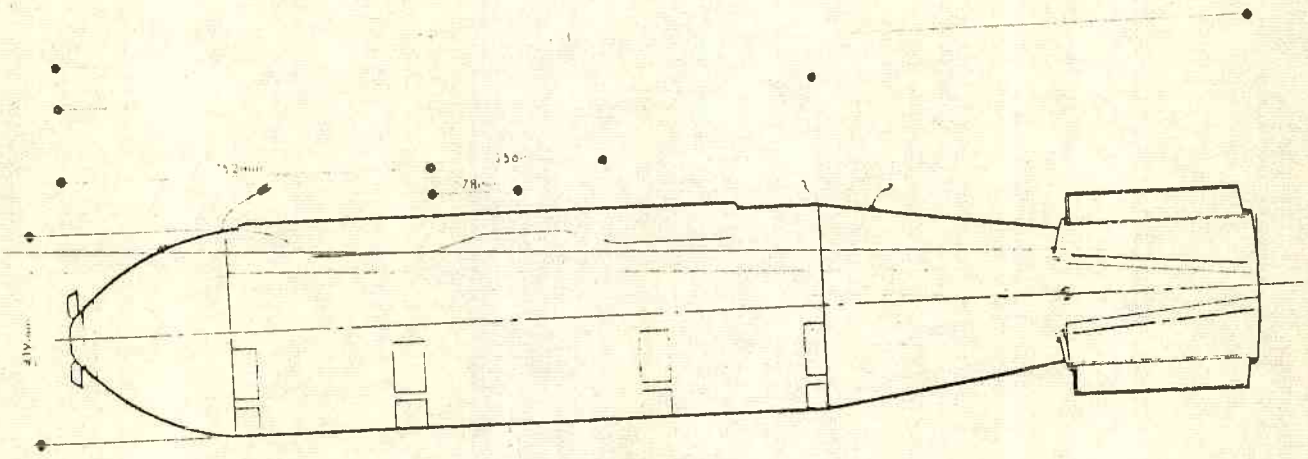
BL 755 for low-level close-support

The operational necessity for air-to-ground attacks carried out at low level, in the close support of ground forces, is now well established.

Current and future strike aircraft have been designed to penetrate enemy defence systems by virtue of their high-speed, low-level capabilities. There is, therefore, a need for a new weapon compatible with such aircraft.

The BL 755 concept is based essentially on the 'shot-gun' principle of compensating for aiming errors by covering the target area with a pattern of evenly distributed bomblets. Studies and evaluations have established that the BL 755 capable of scattering a large number of dual-function bomblets over the target area, is many times more effective against typical battlefield or tactical targets than either single bombs or small sticks of high explosive bombs.

BL 755 has been designed and developed to meet this requirement for a modern weapon to deliver, from a low level, a relatively high quantity of explosives yielding a high kill probability against a range of small hard and soft targets encountered in the battlefield and immediate tactical area.



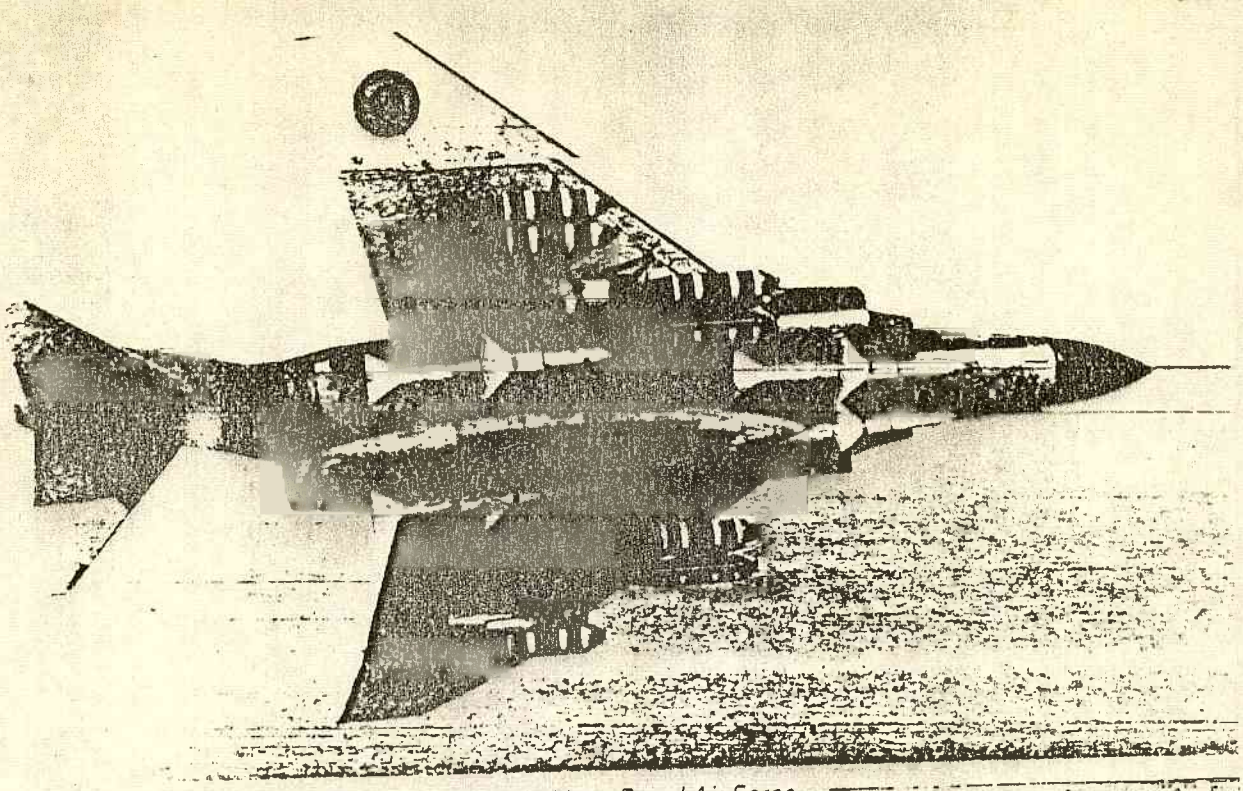
Leading dimensions of the BL 755 anti-armour weapon

The mode of operation of the BL 755 anti-armour weapon is simple yet effective, as can be seen in the sequence of photographs on the facing page.

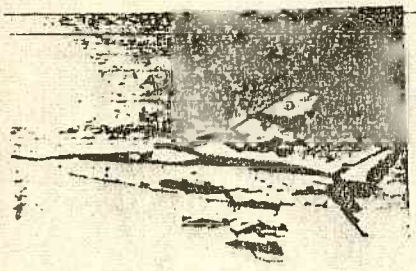
In addition to its tactical advantages, BL 755 weapon has the following technical advantages:

- The bomb incorporates a safety mechanism which provides protection for the aircraft during carriage, release and deployment of the bomblets.
- It is suitable for external or internal carriage on all current and future tactical strike aircraft
- It is capable of being carried with either single or twin-lug suspension
- It can be used with simple or complex sighting systems
- With an unlimited shelf life, the weapon requires no system check-out before flight
- It is immune to electronic counter-measures
- With a nominal weight of 273 kg (600 lb) this weapon exhibits considerable improvements in terms of weight and cost-effectiveness over existing weapons employed in the close-support role
- The flexibility and high kill probability of the BL 755 greatly enhances the overall effectiveness of any strike aircraft.

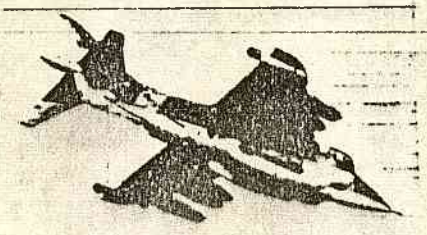
All enquiries regarding this weapon should be made to the Ministry of Defence, Sales, Stuart House, 23–25 Soho Square, London, England, W1V 5FJ; telephone: 01-632 3333; cables: Avsupp London; telex: 22241.



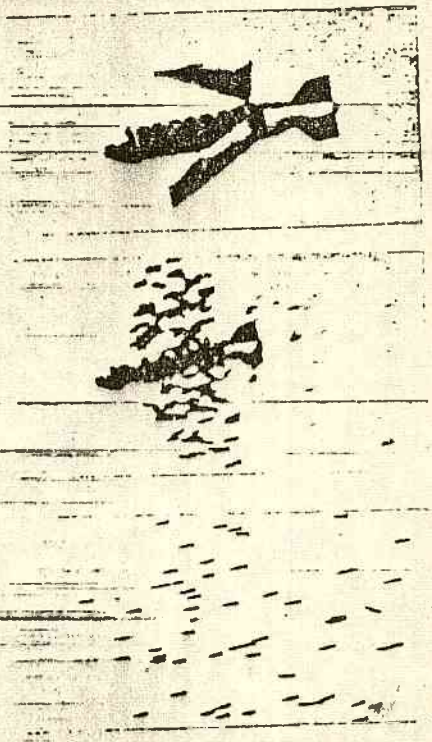
...e. Eight wing-mounted BL 755 weapons carried by a Royal Air Force ...tom bomber in the ground-attack role

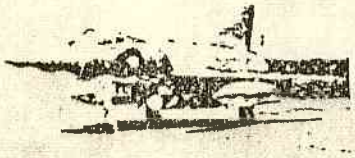


...aircraft with four BL 755 ...ing pylons



Harrier with two outboard pylon-mounted BL 755 and five 450 kg (1000 lb) retarded bombs





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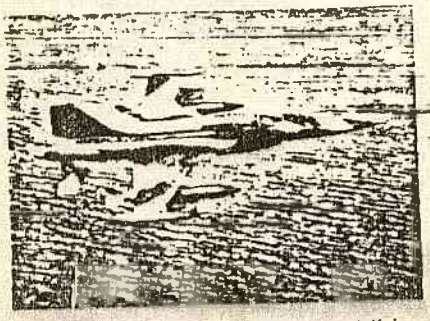
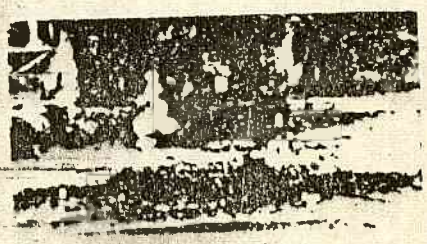


NF5A with two BL 755 in addition to long-range fuel tanks



...ence of unretouched frames from a trials film of the deploy-... BL 755 anti-armour weapon, the resulting bomblet 'cloud' ...e against a tank target

...ting Group
...INEERING LIMITED
...othill, Bedford, Great Britain, MK45 2HD
... Ampthill (0525) 403431 Cables: Huneng Ampthill Telex: 82105

Bomb retarder

air-brake tail unit for low-level bombing

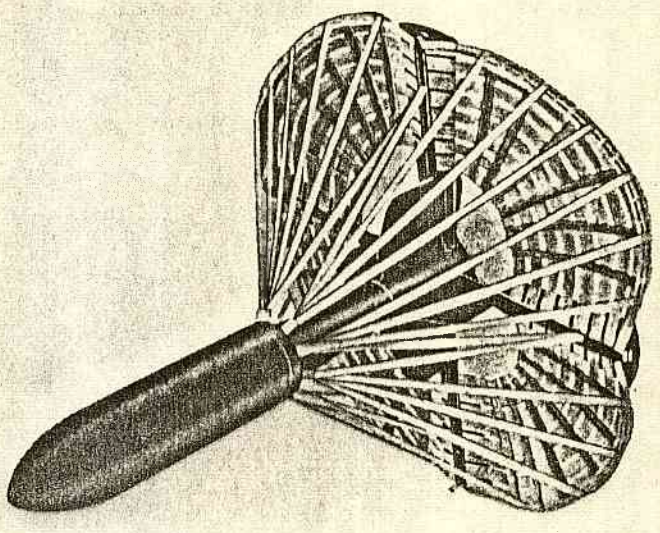
The retarder meets UK and NATO requirements for safe and effective bombing in the low-level strike role. It is suitable for use with all current and projected aircraft capable of carrying bombs in the 227–453kg (500–1000lb) range (UK and US types, see table).

The equipment is designed for use at altitudes and speeds which offer the highest chances of defence penetration. Bomb retardation reduces the high risk of fragment damage to the aircraft by ensuring a safe separation between aircraft and bomb. Only simple pilot-operated sighting equipment is required.

The system is incorporated in a new bomb tail unit with an air brake of composite design and a special environment-sensitive fuze.

Construction of the tail is based on a rigid body attachment ring and centre cone enclosed by four rear-hinged skin sections which are supplemented by interconnecting ribbon fabric to form a fast-acting and reliable air brake of consistent performance. The air-brake release has a timer-controlled function initiated by a lanyard at bomb release. A second lanyard unlocks a rear-mounted fuze arming vane which, in turn, permits the fuze to monitor the bomb retardation time function and to arm or sterilise the bomb, depending on correct or incorrect conditions of release and operation. The system is quantity-produced and in general service with the Royal Air Force.

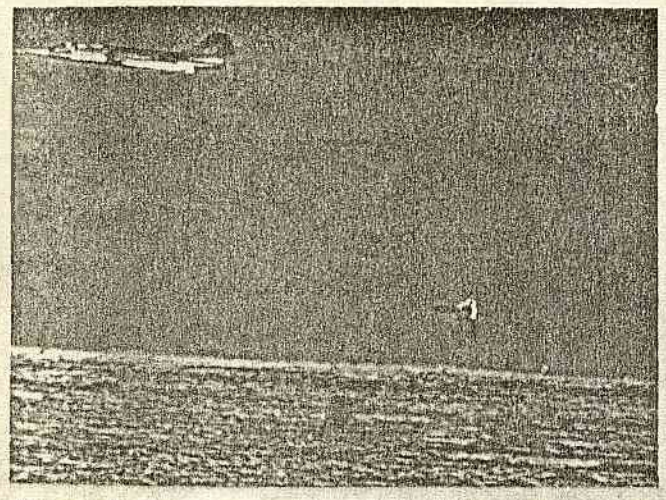
Among the aircraft suitable for the use of retarded bomb techniques the following are typical examples: Canberra, Lightning, Hunter, Mirage, Jaguar, Vulcan, F 104 Starfighter, F 86 Sabre, Phantom, Buccaneer and BAC 167 Strikemaster.



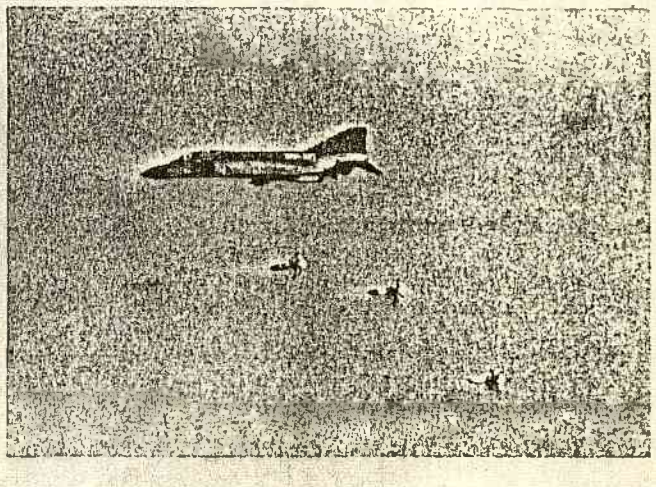
Bomb with air-brake retarder tail in the open position, showing fabric ribbons deployed

Bomb types (UK and USA)

UK	*kg*	*lb*	*US*	*kg*	*lb*
Mk 2	453	1000	M 64	227	500
Mk 6	453	1000	M 65	453	1000
Mk 6*	453	1000	Mk 82	227	500
Mk 7*	453	1000	Mk 83	453	1000
Mk 9	453	1000	M 117	340	750
Mk 10	453	1000			
Mk 11	453	1000			
Mk 11*	453	1000			
Mk 12*	453	1000			
Mk 13–16	453	1000			
Mk 1 & 2	245	540			



Above: Twin release of bombs with retarder system from Starfighter during a low-level attack on a defended target



Right: Multiple release from Phantom F4

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1102.311

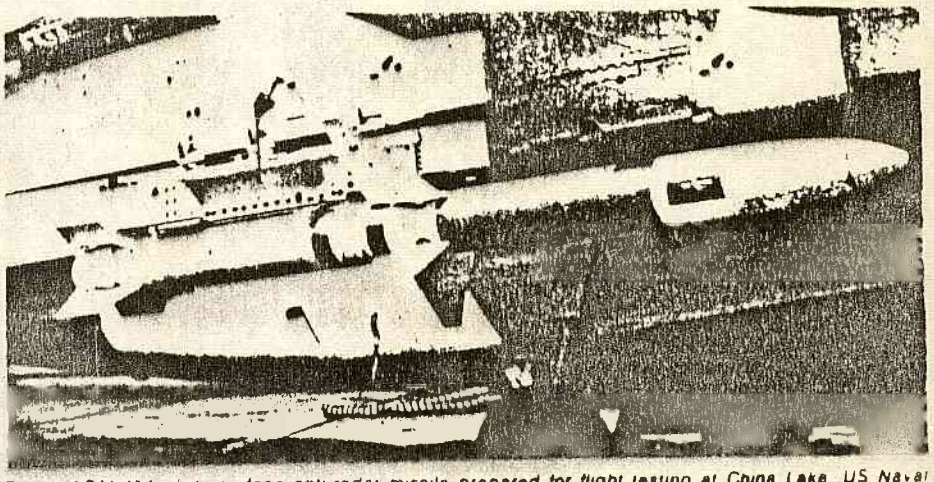
SHRIKE (AGM-45A) AIR-TO-SURFACE MISSILE

Anti-radiation air-to-surface missile for the destruction of ground defensive radar installations. Official details include: length 304.8cm, diameter 20cm, wing span 91.4cm, weight 177kg, solid-propellant rocket motor. Estimated speed and range are: Mach 2 and 12 to 16km. A 66kg high-explosive fragmentation warhead is carried.

OPERATION

Initial warning of illumination of Shrike-carrying aircraft by ground defence radars is probably obtained from ECM receivers installed in the aircraft. When with appropriate range, the Shrike sensor heads are switched on and the missiles fired when target acquisition has been achieved. After release, the missile radar receiver continuously senses the direction of arrival of radar radiation from the target and generates command signals for the missile guidance system to home it on to the radar.

Shrike guidance heads have been developed that provide for effectiveness against enemy early warning, ground control intercept, and SAM guidance radars, each of which covers a different frequency range. The frequency range of a particular Shrike version is denoted by a suffix number to the AGM-45A designation, and there are at least 13 of these. The relationship between these numbers and the radar frequency bands is classified but a few other details are available. The -5 model was cancelled before production started. The -1, -1A, and -2 models produced between 1963 and 1966 are thought to have covered the X and C-bands. The -3, -3A and -3B were produced from 1963 to 1969 and may have an anti-ship radar role. The -4 was produced between 1966 and 1968, and the -6 has been used by USAN and USN from 1965 to 1970. The -7 is thought to cover one or more of the lower frequency bands. A 7A version was cancelled in May 1976 after flight tests had revealed antenna polarisation problems that resulted in difficulties in homing onto one type of radiation signal that constituted one of the main targets. The -8 programme ran from 1967 to 1970/71 when it was cancelled in favour of HARM development. The -9 and -10 versions have been developed for the USAF and the USN has no plans at present to use either model. The Frequency coverage of these two heads extends over more of the radar spectrum than six earlier models of Shrike combined. Based on the specific radar to be attacked, the operational commander selects the most appropriate weapon option. The USAF use Shrike on modified F-105 and F-4 aircraft, termed Wild Weasel aircraft, with special radar homing and warning equipment. The USN employs the missile on A-4, A-6, and A-7 aircraft.



Shrike AGM-45A air-to-surface anti-radar missile prepared for flight testing at China Lake, US Naval Weapons Centre (US Navy)

DEVELOPMENT

System Manager for the Shrike programme was the US Naval Weapons Centre, and development started in 1962. Production started in 1963 with operational deployment in 1964.

STATUS

Production is continuing for use on USAF aircraft. In FY 1977 the USAF procured 1,775 of the -9 version and 150 of the -10 model.

Up to FY 1978 about 24,000 Shrike missiles of all models had been procured and the 1978 budget allowed for the purchase of another 600. A similar procurement was planned for FY 1979.

MANUFACTURERS

Joint prime contractors: Texas Instruments and Sperry Rand Univac.

1173.311

AS.11 AIR-TO-SURFACE MISSILE

Wire-guided multi-purpose, lightweight air-to-surface missile. The SS-11 was originally conceived as a general-purpose battlefield weapon for deployment on surface vehicles, but it has been successfully adapted for use with helicopters, hovercraft, and surface vessels. Designation of the former version is AS.11.

Principal characteristics are: length 1.2m, diameter 16.4cm, wing span 50cm, weight 29.9kg. Range is 3000m and speed about 160m/s when launched from a helicopter at the hover. Time of flight is between 18 and 20s. The SS.11 B1 can be equipped with three types of warhead, anti-tank, a 'high-effect' high explosive warhead, or fragmentation type.

OPERATION:

Using a stabilised optical sight, the operator guides the missile after launch (aided by tracer flares attached to the missile), and then uses a control stick to transmit command signals to the missile via wires to align the missile flight path with the target. Maintaining this alignment results in the missile hitting the target.

STATUS:

At 1 January 1977, 167,000 of the various versions of the SS.11 series have been supplied to 21 different countries.

MANUFACTURERS:

Société Nationale Industrielle Aérospatiale, Division des Engins Tactiques, 2 rue Béranger, 92320 Chatillon, France.

Scout helicopter carrying SS.11 air-to-surface wire-guided missiles

Apêndice 5

7.62mm L1A1 rifle

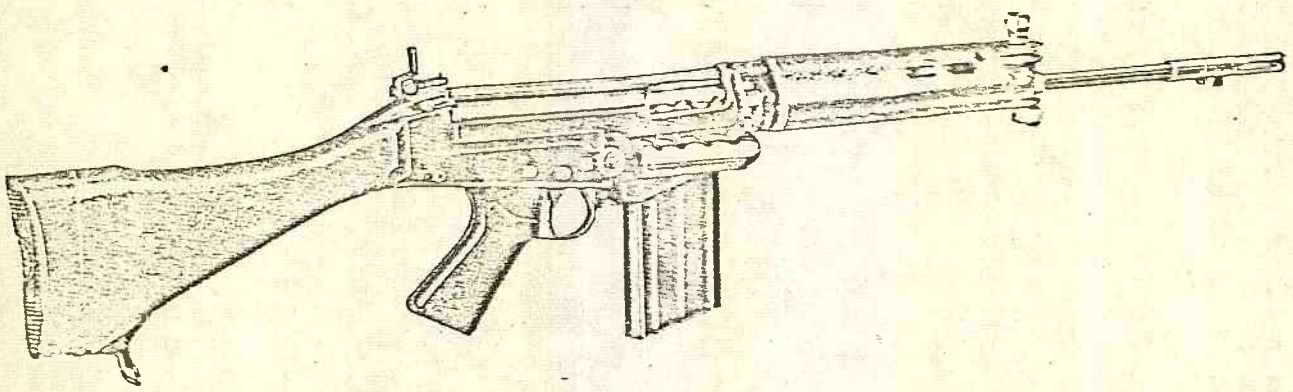
The 7.62mm L1A1 is an easily handled gas-operated self-loading rifle adapted from the very successful Belgian FAL rifle, with modifications to suit the special requirements of the British Forces. While the rifle is normally fitted for the self-loading single-shot mode, minor component changes in the trigger mechanism enable the rifle to be fully automatic. The cocking handle is fitted on the left hand side of the weapon, allowing the right hand to remain on the trigger when cocking for firing. Both the cocking handle and carrying handle fold down when not in use.

Robust, reliable and simple to maintain and operate, the L1A1 has continued as a leading design for over 20 years and currently remains the standard British infantry rifle. A trained man can reach a standard of rapid fire at a rate in excess of 20 accurate shots per minute firing at separate targets. All rifles are now fitted with plastic furniture: the butt may be varied in length by using one of four different butt-plates, thus enabling the weapon to be adjusted to suit the stature of the individual firer.

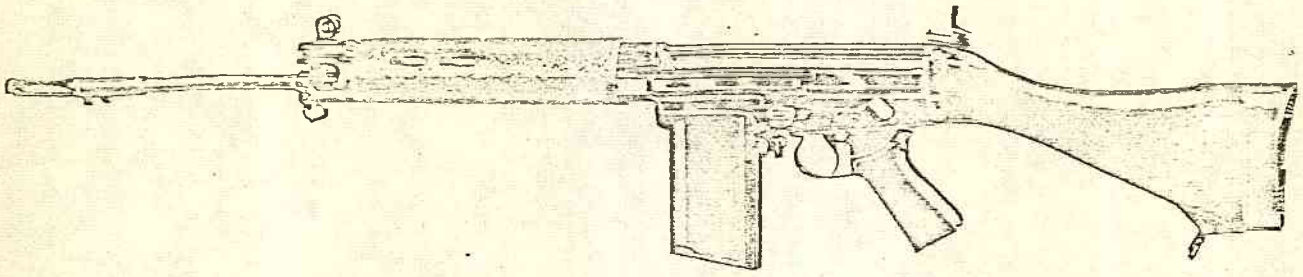
DATA
Cartridge: 7.62mm x 51
Operation: Gas, single shot
Method of locking: Tilting bolt
Feed: 20-round box magazine

WEIGHTS
Rifle only: 4.3kg
Rifle and full magazine: 5kg
Magazine empty: 255g
Magazine full: 738g

LENGTHS
Rifle alone: 1,143mm
Barrel: 554mm



Two views of the latest pattern L1A1 7.62mm rifle

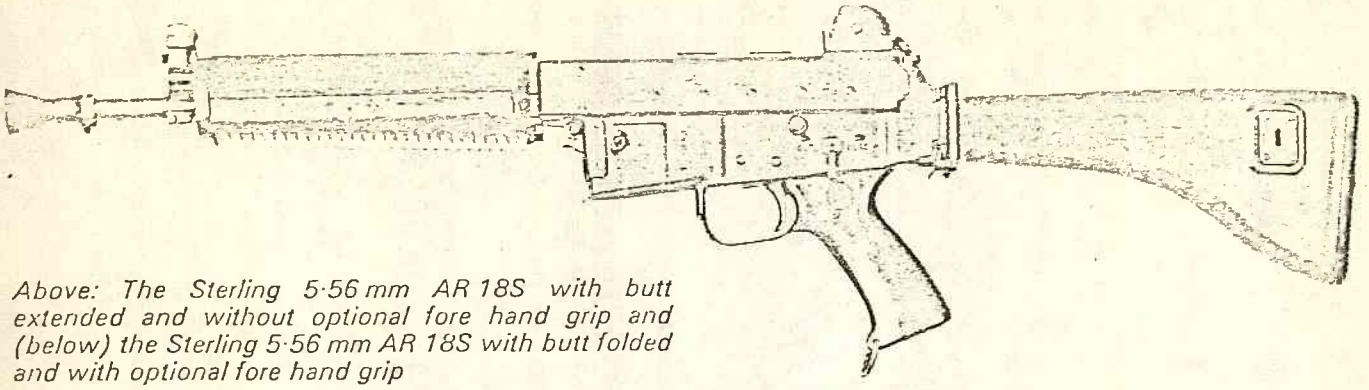


MECHANICAL FEATURES
Barrel: Regulator: Exhaust to atmosphere type
Rifling: 6 grooves RH 1 turn in 305mm
Sights: Foresight: Trilux
Rearsight: Apertures
Sight radius: 554mm
Sight Unit Infantry Trilux (SUIT) may be fitted

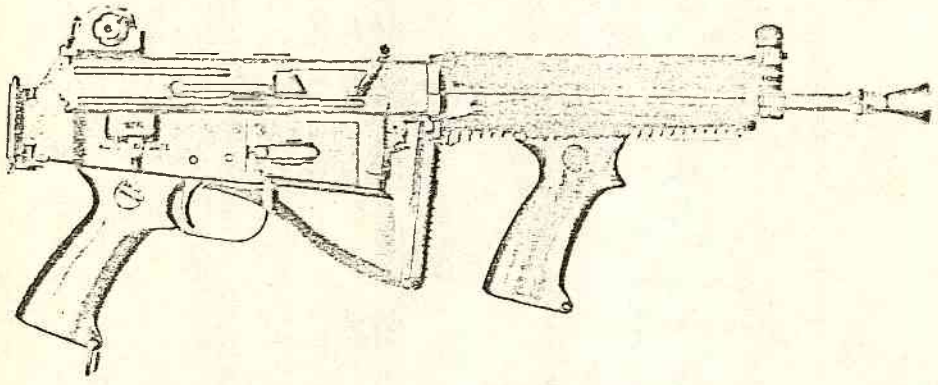
FIRING CHARACTERISTICS
Muzzle velocity: 838 m/s
Muzzle energy: 1,739 J
Recoil energy: 8.67 J
Chamber pressure: 339.57 MPa
Rate of fire: Semi-automatic: 40 rounds/min
Effective range: 600m with SUIT

Manufacturer: Royal Small Arms Factory, Enfield Lock, Middlesex
Status: Current
Service: UK forces, also Australia, Barbados, Canada, Gambia, Guyana, Malaysia, New Zealand, Oman and Singapore. Made under licence in Australia and Canada

Sterling sub-machine guns and AR 18 rifles

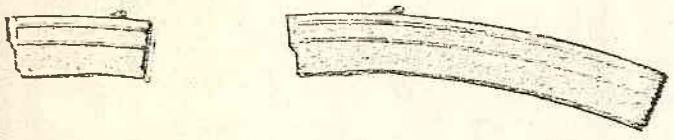


Above: The Sterling 5·56 mm AR 18S with butt extended and without optional fore hand grip and (below) the Sterling 5·56 mm AR 18S with butt folded and with optional fore hand grip



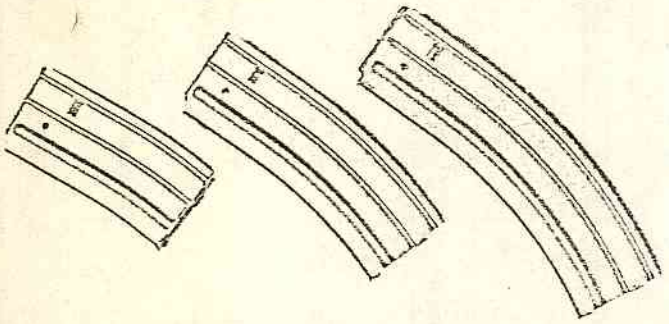
Magazines

The following all-steel magazines are available for Sterling sub-machine guns:



	10 rounds	34 rounds
Capacity:		
Length:	89 mm	241 mm
Weight, empty:	150 g	300 g
full:	270 g	710 g

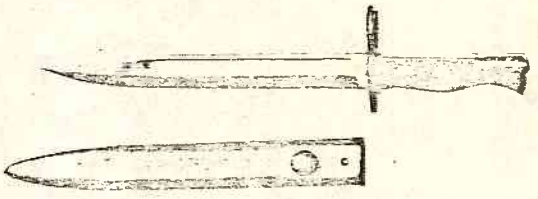
The following all-steel magazines are available for Sterling AR 18 and AR 18S rifles; they also fit AR 15, M16 and M16A1 rifles:



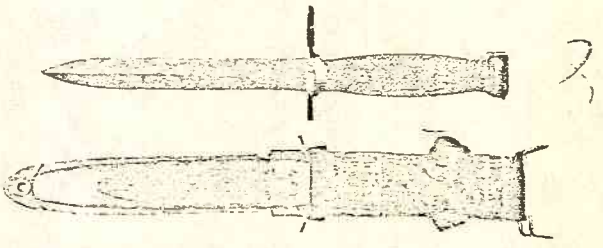
	20 rounds	30 rounds	40 rounds
Capacity:			
Length:	121 mm	181 mm	232 mm
Weight, empty:	135 g	185 g	235 g
full:	360 g	525 g	690 g

Bayonets

Bayonets and scabbards as shown here are available for Sterling Mk 4 and AR 18 rifles.



For Sterling Mk 4 only



For Sterling AR 18 rifles: it also fits AR 15, M16 and M16A1 rifles

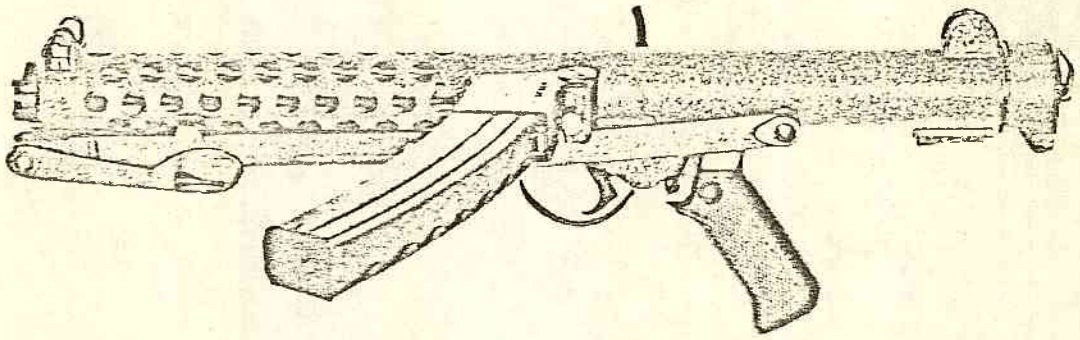
STERLING ARMAMENT COMPANY LTD
Sterling Works, Rainham Road South, Dagenham, Essex, Great Britain, RM10 8ST
Telephone: 01-595 2226 Cables: Sterling Dagenham Telex: 896895 Sterln G

Appendix 7

Small arms

Sterling sub-machine guns and AR 18 rifles

The Sterling Group has been designing and manufacturing small arms for over 40 years. Sterling weapons have been supplied to armed and police forces in over 90 territories throughout the world.



The Sterling Mk 4 9 mm sub-machine gun (L2A3) with the butt folded

Sterling Mk 4

This is the standard 9 mm sub-machine gun and is in service with the armed forces of the UK and of over 90 other countries. The Mk 4 is exceptionally accurate and reliable. It continues to function under the most adverse conditions of mud, sand, snow and ice. The folding butt makes for easy carriage in vehicles and aircraft.

Sterling Patchett Mk 5

This is the only silenced weapon in general service. It was designed to meet a British General Staff requirement for a silent weapon in which mechanical noise was not to be heard at 30 m and to be unrecognisable as a firearm at 50 m. With the exception of the barrel, bolt and silencing components all other components are interchangeable between the Mk 4 and Mk 5. The design of the Sterling Patchett ensures not only the silencing of the noise of discharge but also of the crack of the bullet without needing special ammunition or sacrificing accuracy. Both the Mk 4 and Mk 5 use the universally available 9 mm Parabellum ammunition.

Design features of Sterling SMGs

A strong and rigid folding butt and a long sight base enable the firer to take advantage of the built-in rifle-like accuracy of the Sterling 9 mm weapons.

Sterling 5·56 mm AR 18 automatic rifle

This combat rifle is now being manufactured by Sterling. It is a modern development in rifle design. It is a light and easily handled weapon capable of both single shot and fully automatic fire with extreme accuracy.

The rifle is gas-operated with a rotating bolt locking system and fires from the closed bolt position. The bolt has seven locking lugs which engage with seven similar lugs on the barrel extension and contain the full force of firing within these two components. This system permits the use of lightweight steel pressings for the main body of the rifle.

The barrel is air-cooled and fitted with a flash suppressor/recoil compensator which serves as a grenade launcher and front support for the bayonet. The ventilated guard surrounding the barrel is of heat resisting material.

The trigger mechanism may be set for automatic or semi-automatic operation or locked in the safe position by the setting of one selector which is accessible from both sides of the rifle.

The rifle has a folding butt made of durable plastics of high impact strength unaffected by exposure. Folding and unfolding are quick, simple operations; the rifle can be fired with the butt in either position.

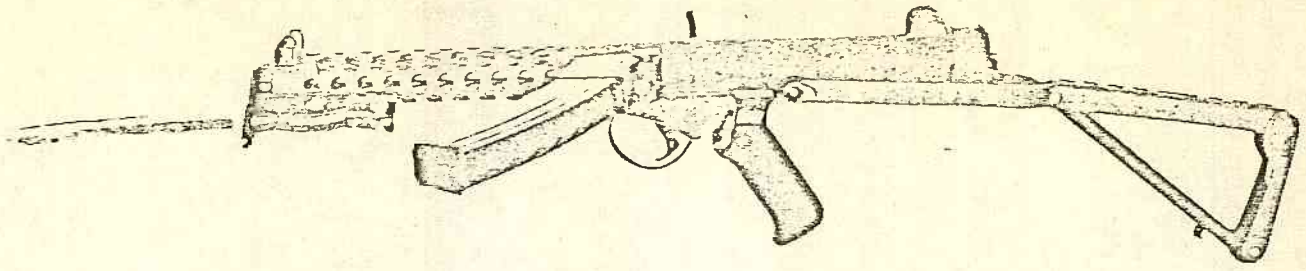
Sterling AR 18S

The AR 18S is a compact version of the AR 18 using the same rifle cartridge. It provides rifle accuracy with a weapon of sub-machine dimensions. All parts are interchangeable with the standard AR 18 except those forward of the receiver.

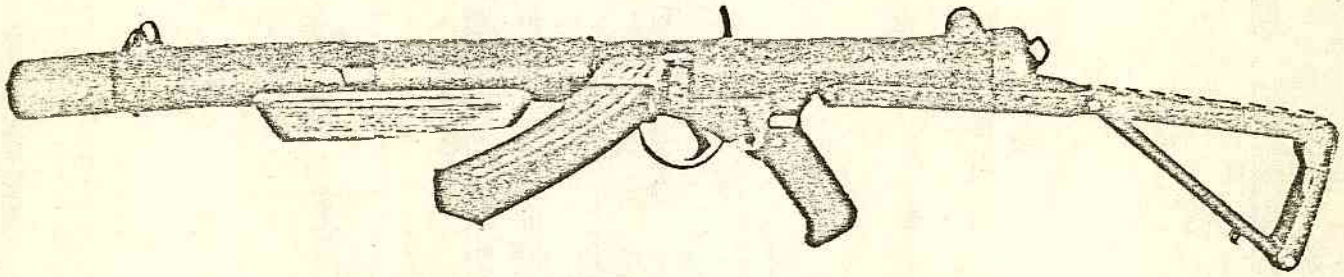
The barrel has been shortened by 175 mm and an optional pistol grip has been added under the hand guard. The weapon can be used with the butt in either position or removed altogether. Its compactness makes it an ideal weapon for aircraft, tank and vehicle crews.

Specification

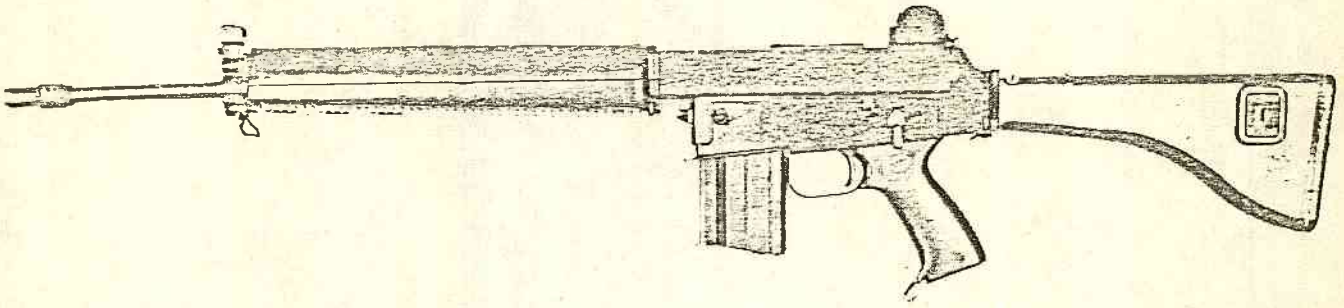
		SMG Mk 4	Mk 5	AR 18	AR 18S
Calibre		9 mm	9 mm	5·56 mm	5·56 mm
Length	butt folded	482 mm	644 mm	737 mm	559 mm
	butt extended	690 mm	856 mm	965 mm	794 mm
Weight	weapon only	2·70 kg	3·54 kg	3·0 kg	2·6 kg
	with full magazine	3·50 kg	4·25 kg	3·32 kg	2·92 kg
Barrel	length	198 mm	198 mm	457 mm	282 mm
Sights	radius	410 mm	502 mm	495 mm	292 mm
	type—rear	aperture	aperture	aperture	aperture
	fore	blade	blade	post	post
	range settings	100 m and 200 m	100 m only	200 m and 400 m	200 m and 400 m
Cyclic rate	rounds per min	550 approx	550 approx	750 approx	750 approx
Magazines	capacity	10 or 34 rounds	10 or 34 rounds	20, 30 or 40 rounds	20, 30 or 40 rounds



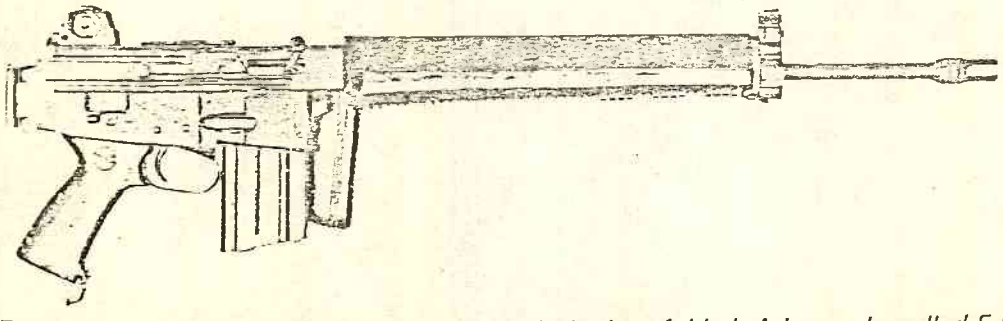
The Sterling Mk 4 sub-machine gun (L2A3) with the butt extended and the optional bayonet fitted



The Sterling Patchett Mk 5 silenced 9 mm weapon (L34A1) with the butt extended



The Sterling 5·56 mm AR 18 combat rifle



The Sterling 5·56 mm AR 18 combat rifle with the butt folded. A heavy-barrelled 5·56 mm light machine gun is currently being developed for production. The AR 18S model is shown on the following page. All weapons shown can be supplied as carbines in single-shot form

STERLING ARMAMENT COMPANY LTD
Sterling Works, Rainham Road South, Dagenham, Essex, Great Britain, RM10 8ST
Telephone: 01-595 2226 Cables: Sterling Dagenham Telex: 896895 Sterln G

Apendice 8

7.62mm RIFLE L42A1

The L42A1 rifle came into service to meet the need for a sniper's rifle.

It is a conversion from the .303 No 4 rifle using Rifle No 4 Mk I(T) or Mk I*(T). These No 4 rifles were equipped originally with the Telescope Sighting No 32 Mk 3, and were used for sniping.

The conversion in all major aspects is similar to that used for the L39A1 rifle. However the trigger is pinned to the trigger guard – not mounted on the receiver. There is an additional swivel, secured by the front trigger guard screw.

The magazine on the L42A1 takes ten 7.62mm × 51 cartridges and has an ejector plate, spot welded to the left rear lip.

There are differences between weapons converted from the No 4 Mk I and the No 4 Mk I*. The bolt head has a catch on the Mk I which must be depressed to permit the bolt head to engage or disengage with the guide rib. The Mk I* has a break in the guide rib but no catch.

Telescope brackets are fitted to the left side of the body to take the Telescope, Straight, Sighting, L1A1 which is modified from the Telescope Sighting No 32 Mk III of the No 4 (T) rifle. Those brackets also allow use of the image intensifier sight.

The open sights of the No 4 Rifle have been retained and the Mk I backsight is used. To allow for the different ammunition the datum line has been lowered by 0.070 inch (1.78mm) and the modified slide marked 'm' on the right side.

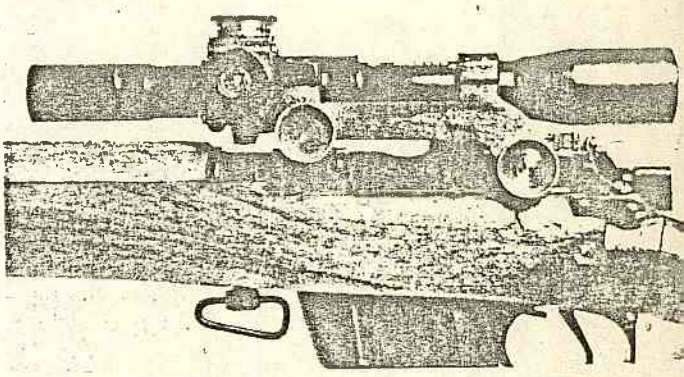
The foresight is a spit block sweated to the barrel and it has an adjusting screw allowing the foresight to be clamped to the block. There are eight sizes of foresight from −0.03 inch to 0.075 inch by increments of 0.015 inch (−0.762-1.905mm × 0.381mm) for zeroing.

ACTION

The action of the L42A1 is exactly the same as that of the L39A1 except for the ejector function.

DATA

Cartridge: 7.62mm × 51
Operation: Manual, single shots
Method of locking: Rotating bolt
Feed: Either single round or 10-round box magazine



Straight sighting telescope L1A1 mounted on 7.62mm L42A1 rifle

WEIGHTS

Rifle: 4.43kg
Trigger pull: First pull 1.36-1.81kp
Second pull 2.27-2.95kp

LENGTHS

Rifle: 1,181mm
Barrel: 699mm

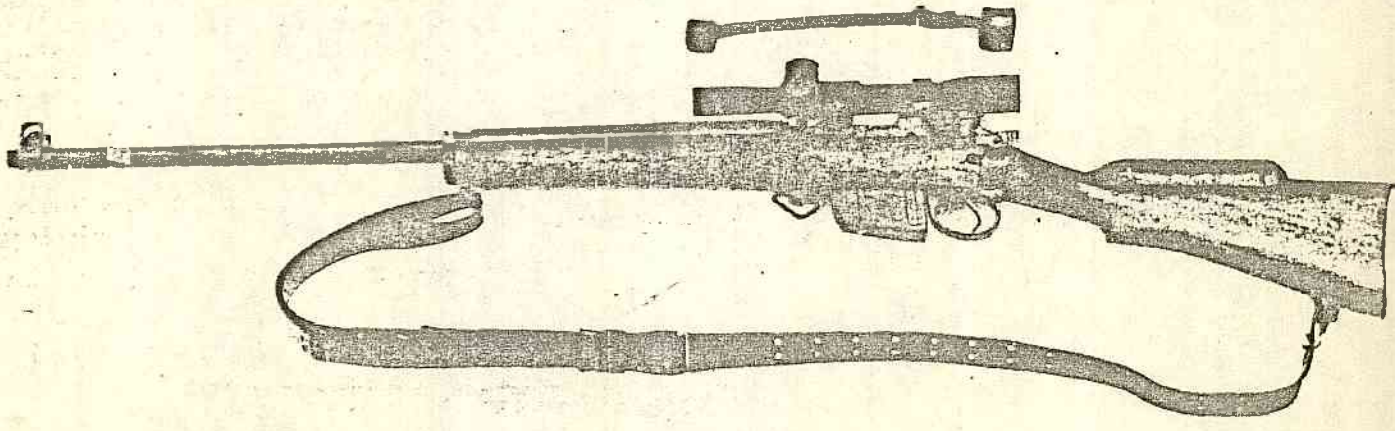
MECHANICAL FEATURES

Barrel: Rifling: 4 grooves RH 1 turn in 305mm
Sights: Iron sights as described in text or Telescope L1A1

FIRING CHARACTERISTICS

Muzzle velocity: 838 m/s

Manufacturer: Royal Small Arms Factory, Enfield Lock, Middlesex
Status: Current. Available
Service: UK forces

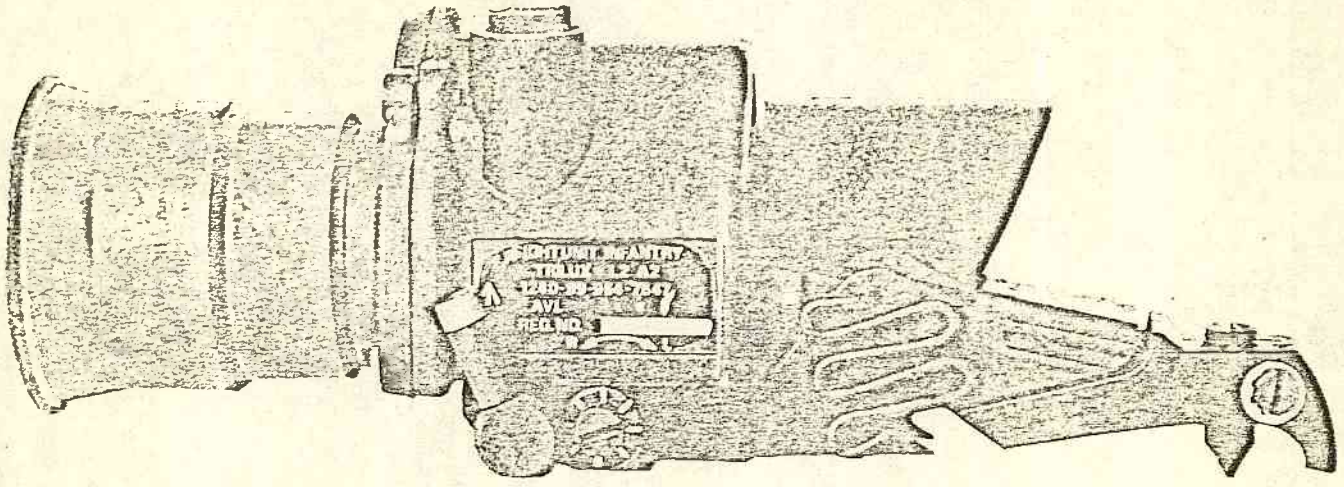


L42A1 rifle

Splndie 9

Weapon and vehicle sights

for day and night use



SUIT (Sight Unit Infantry Trilux) L2A2

The sight has been designed and developed by the British Royal Armament Research and Development Establishment to enable the infantry man to fight at night with greater effectiveness, and to identify and engage ill-defined targets at greater ranges during day use. It is suitable for attachment to all rifles and light machine guns. Removal is a quick and easy operation. When the sight is refitted, the weapon can be fired instantly without readjustment of the sight. It is now in service with the British Army. It has NATO ref No 1240-99-964-7647.

The normal type of cross-wire graticule is replaced by an aiming pointer which is broad enough to give a positive point of aim without obscuring the target at longer ranges. Together with the rubber eyeguard, which accurately positions the eye, it provides all that is necessary for quick and accurate battle shooting.

Zero adjustment has been simplified so that it can be performed with a screwdriver or small coin. There are two graduated adjusting screws, clearly marked L and R (left and right) and E and D (elevation and depression); each graduation corresponding to a movement of 1 mil (100 mm at 100 m).

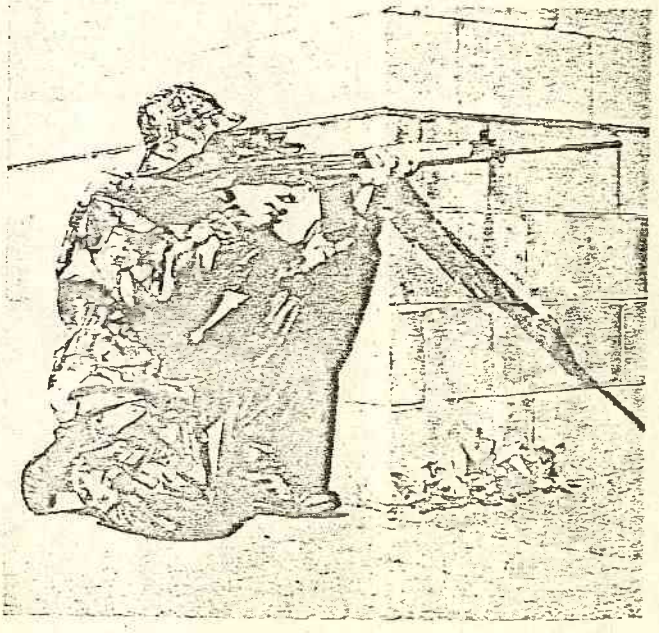
Range adjustment is provided by means of a two-position control lever mounted on the right-hand side of the body. In the rear position the sight is set for ranges up to 400 m, in the forward position for ranges from 400 to 600 m.

The aiming pointer is illuminated by a red tritium (Trilux) light source which requires no external power supply. The illumination is infinitely variable from zero to maximum brightness by using the external control on the top of the sight body.

The sight is at present available with mountings to fit the 7·62 mm FN rifle, the 7·62 mm FN machine gun (GPMG), the 7.62 mm G3 rifle, the 5·56 mm M16 rifle and the 84 mm infantry anti-tank gun (Carl Gustav).

Specification

Overall length: 195 mm (7·8 in), width: 71 mm (2·8 in), height: 63 mm (2·5 in)
Weight: 445 gram (15·7 oz)
Magnification: ×4
Objective aperture (clear): 25·5 mm
Field of view: 8° (140 mils)
Light transmission: greater than 80%
Exit pupil diameter: 6·6 mm
Eye relief: 35 mm
Graticule illumination: red tritium light source (variable)
Environmental conditions: completely sealed; operation and storage between –75°C and +90°C



TRADUCCION - APENDICE

Miras de armas: (para día y noche) SUIT L2A2

Esta mira ha sido diseñada para permitir al hombre de infantería luchar en la noche con mayor efectividad e identificar los blancos a mayores alcances durante el día. Es adecuado para adjuntarle a todos los rifles y armas livianas. Para sacarla es una rápida y fácil operación. Cuando la mira se recoloca, el arma puede ser disparada instantáneamente sin reajustar la mira.

El tipo normal de ocular cuadriculado de alambre cruzado es reemplazado por medio de un guión el cual es lo suficientemente amplio como para dar un punto visible en la mira sin oscurecer al blanco en los alcances más largos. Juntamente con el resguardo de goma, el cual coloca exactamente al ojo del tirador, proporciona todo lo que sea necesario para un disparo rápido y exacto.

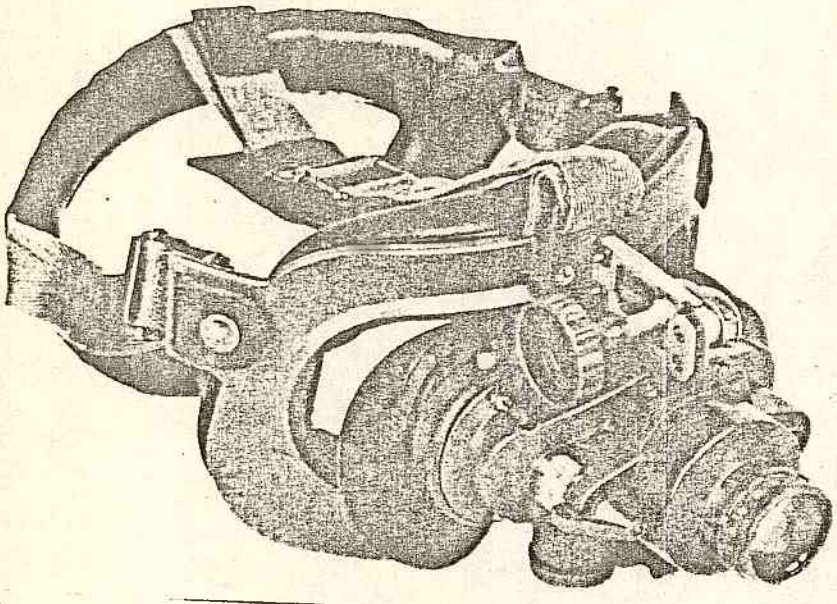
El ajuste cero se simplificó de tal forma que puede ser hecho con un destornillador o una pequeña moneda. Hay dos tornillos de ajuste graduados, claramente marcados con las letras L y R (Derecha y Izquierda) y E y D (elevación y depresión), cada graduación corresponde a un movimiento de 1 mil (100 mm. en 100 m.)

El ajuste del alcance está proporcionado por medio de una palanca de control de dos posiciones montada sobre el lado derecho del cuerpo. En la posición trasera, la mira está graduada para alcances hasta 400 m., en la posición delantera, para alcances de 400 a 600 m.

El indicador de dirección está iluminado por una luz roja de tritium (Trilux) que no requiere abastecimiento externo. La iluminación es continuamente variable de cero hasta una brillantez máxima, usando el control externo en la parte de arriba del cuerpo de la mira.

La mira actualmente dispone de montantes que equipan rifles FN de 7,62 mm, armas FN de 7,62 MM (GPMG), rifle G3 de 7,62 mm. rifle M16 de 5.56 mm. y arma anti tanque de infantería de 84 mm (Carl Gustav).

Apêndice 10



(similar)

Appendix 11

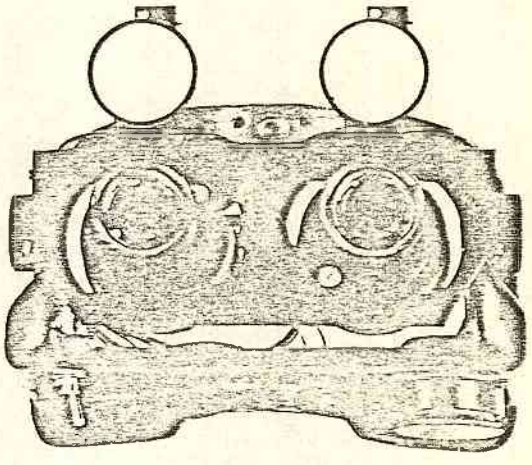
GHT VIEWING GOGGLES TYPE SS70

These goggles are designed to enable the wearer to focus on a target in remely low ambient lighting and to permit free use of his hands while he ntinues to observe the target.

The goggles weigh 9.30 grams, but the head harness increases the total 1.13kg. They can be focused from 250mm (10in) to infinity. They are wered by a single 4.5-volt mercury battery with a working life of approxitely 16 hours.

Development started on a UK government contract in 1971.

nufacturer: Rank Pullin Controls, Langston Road, Debden, Loughton, sex



SS70 goggles

(Similar)

Spéndice 12

GRENADE, HAND-RIFLE, ANTI-PERSONNEL, L2

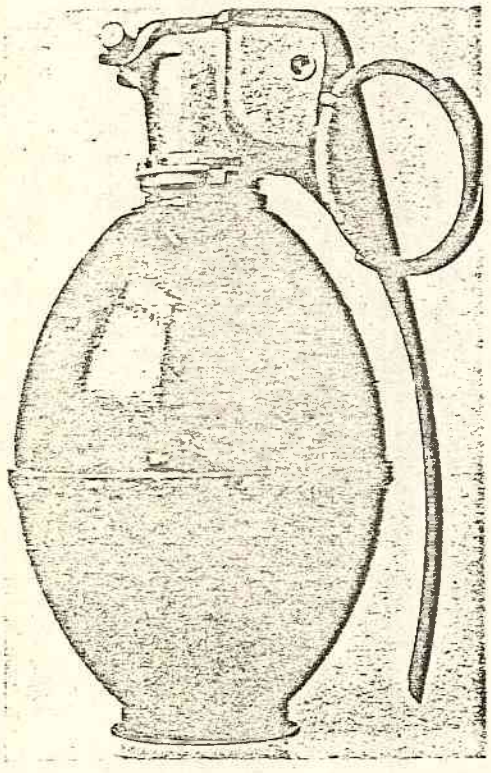
The Grenade L2 is a high explosive anti-personnel grenade based on the USA M26 Grenade and closely resembling it in appearance and performance. It differs in having a separate fuze assembly. It was designed to be thrown by hand or projected from a rifle but the British Army has now dropped the concept of rifle-launched grenades.

The L2 Grenade has superseded the Grenade 36M. It exists in two variants, L2A1 and L2A2, but the only significant difference between the two is in the design of the fuze holder which was modified to assist production.

The grenade consists of a two part, tinned plate outer casing, a coil of notched wire, a fuze (L25), holder, cap and HE filling.

The body assembly (upper and lower) holds the fuze holder in the upper part and the two parts are 40.6mm (upper) and 36.8mm (lower) in length and circular in section. The coil is made from steel wire 2.4mm in section and notched at intervals of 3.2mm. The HE filling consists of 170g of RDX/TNT.

There are a number of models of the L25 fuze. The current issue of the fuze is the L25A6. The fuze consists of a striker assembly and an adapter assembly with detonator, delay pellet and cap housing.



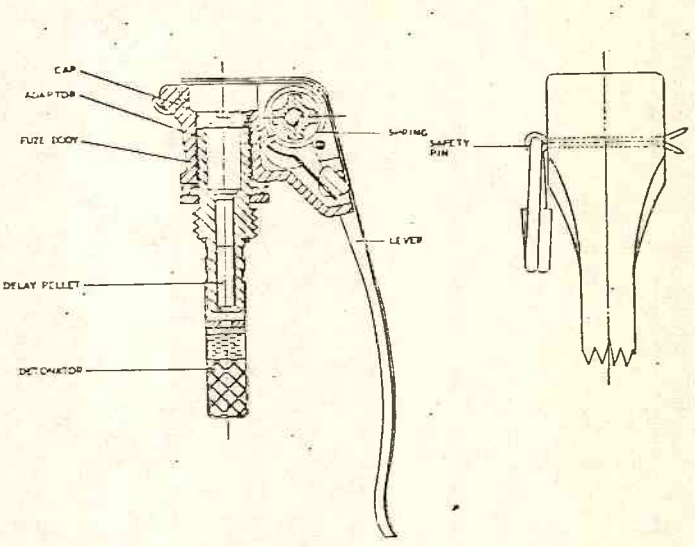
Grenade, hand or rifle, anti-personnel, L2A1

PRACTICE AND DRILL GRENADES

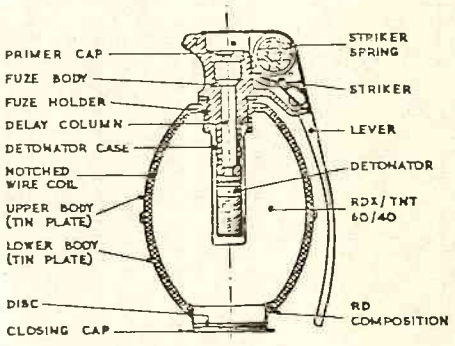
Practice grenades L3A1, 2 and 3 and drill grenades L4A1 and 2 are similar in construction and appearance to the operational grenades. Practice grenades are inert and are painted light blue. Drill grenades are fitted with Drill Fuze, Grenade, Percussion L30 and are painted dark blue.

Full titles are Grenade, Hand-Rifle, Practice, Inert L3A1 etc. and Drill Grenade, Hand-Rifle, L4A1 etc.

Manufacturer: Royal Ordnance Factories
Status: Current. In production
Service: British forces



Fuze, grenade, percussion, L25A3



Sectioned L2A1 grenade

SMOKE GRENADE L8A1

Grenade, Discharger, Smoke Screening L8A1 is the replacement for the L5A1 and L5A2. It is a rubber-bodied, red phosphorus-filled smoke grenade weighing about 380 grams.

Manufacturer: Royal Ordnance Factories
Status: In production

UNITED STATES OF AMERICA

GRENADE, HAND: FRAGMENTATION, DELAY, M67

The M67 grenade is one of the standard grenades in service with the US Army. It is a small spherical grenade which is time-fused and can only be thrown by hand. There are no arrangements for projecting it by any other means.

The steel body is 63.5mm in diameter and it breaks up on detonation to provide the fragments. The M213 fuze is integral with the body and the grenade is issued with its fuze in situ. The fuze is activated by a conventional striker which is held down by the safety lever. The safety lever is retained by two means. The first is the usual split pin which must be pulled out before throwing. The second is a small wire clip, which also holds the lever down. This clip is intended to act as a second safety should the split pin be pulled out unintentionally. In throwing, it is usual to remove the clip first, and leave the pin until the last moment.

Weight: 0.39kg
Length (max): 89.7mm
Diameter: 63.5mm
Max casualty radius: 15m
Throwing range: 40m
Colour: Olive drab w/yellow markings
Packing: 1 per fibre container; 30 per packing box
Filler:
  Type: Comp B
  Weight: 0.18kg
Fuze:
  Model: M213
  Type: Pyrotechnic delay-detonating

Spudice 13

RENADE No 80 WP Mk 1 AND Mk 1/1

The Grenade Hand/Discharger No 80 WP is intended to produce screen-g smoke and may be either thrown or projected from a multi barrel scharger on an AFV, using a Fuze, electric, No F103. It has a tinplate dy filled with white phosphorus, Detonator No 75 and Striker Mechanism enade No 2.

RIKER MECHANISM GRENADE No 2

This consists of an adapter with a screwed in housing for a spring erated striker which is retained in the cocked position by a fly off lever and fety pin.

TONATOR No 75

The Detonator No 75 consists of a .22in rimfire cap attached to a 1.5in 3mm) length of Fuze Grenade No 1 and a cap chamber. The fuze gives a lay of 2.5 to 4 seconds and then initiates a Detonator No 63 Mk 2 or No 78 1.

ZE ELECTRIC No F 103

This has a brass gunpowder magazine, containing Gunpowder G 20, sed by a brass cover into which is set a Fuze Electric No 53 Mk 2.

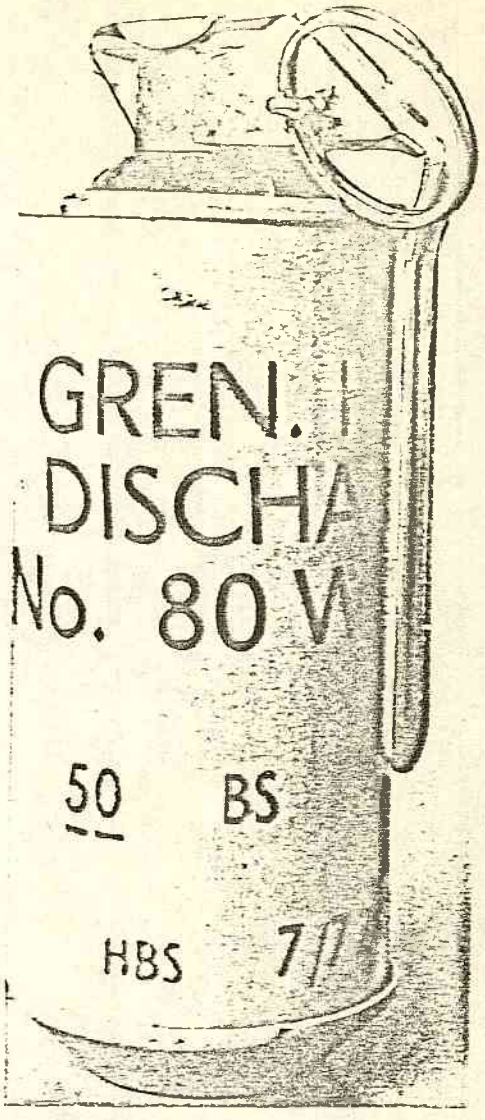
ILL GRENADE HAND/DISCHARGER No 80 Mk 1

This is the body of a service grenade with an inert filling.

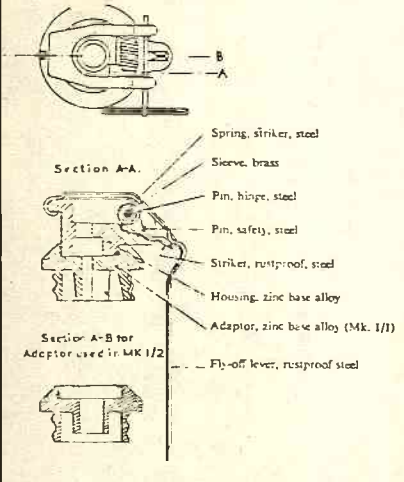
ILL DETONATOR No 75 Mk 1

This is an empty .22 rimfire cap in a cap chamber and connected to a mmy fuze and an empty detonator tube. It is painted white with a hole ough the tube of the detonator.

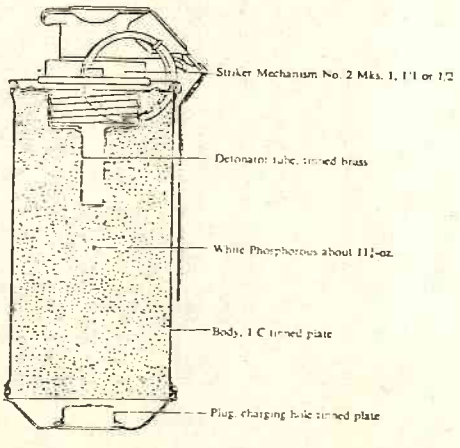
nufactı : Royal Ordnance Factories
tus: Obsolete. Stocks still exist



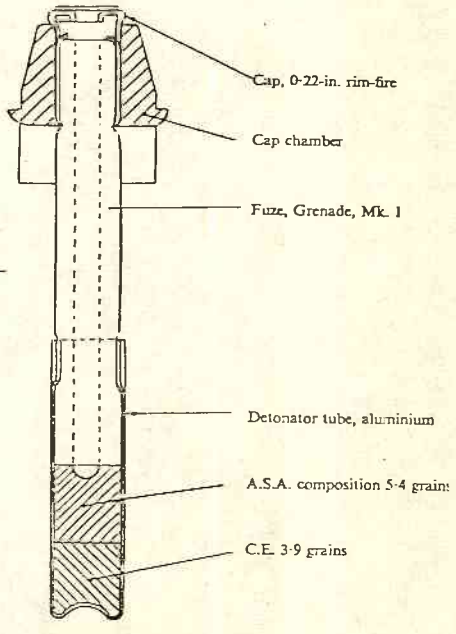
Grenade, hand/discharger No 80 WP Mk 1



r mechanism, No 2, Mks 1/1 and 1/2 (plan with lever removed)



Grenade, No 80 WP Mk 1



Detonator, No 75 Mk 2

LL GRENADE (DISCHARGER) OKE L1

is grenade is inert and will be used for practising all of the grenades in eries used with dischargers. It uses empty components and is painted d blue.

e body of the L1A1 version of this grenade is similar to that of the L5 grenade and is filled with cement to a weight of 425-485 grams.

The L1A2 version differs from the L1A1 in the method of body construction and has an increased weight of filling (880-890g).

Manufacturer: Royal Ordnance Factories
Status: Current

MORTAR

mortar has been developed to replace the 2in Mortar (qv) which has ed such sterling service over so many years. It has been designed by yal Armament Research and Development Establishment (RARDE) Hatstead as a simple weapon which can be operated by one man. opment of this mortar has taken a remarkably long time and after han 10 years the design was thought to be finally complete. This was ortar which we described in *Jane's Infantry Weapons 1979-80*. Within est 12 months this design has undergone a radical change and erable urgency has been applied to the design team so that the d mortar is now very close to being accepted. We understand that it e entering production early in 1981 and the first models will be in e with units from January 1981 onwards.

barrel is still a steel tube, bell mouthed at the muzzle to assist in g bombs and also to add some strength to the vulnerable end of the . This barrel screws on to a breech piece in which is the firing anism. The last firing mechanism gave considerable trouble and was complicated to make; the newer one is a reversion to that which gave ent service on the old 2in mortar, though the opportunity has been to make some few improvements to the components, although the ple of operation is exactly the same. It is trigger-operated with a short ever tripping a firing pin when pulled over centre.

sight has been considerably simplified and one change which will be med by users is the abandoning of the cross-levelling. This had no ace in such a small mortar and did little to improve accuracy.

controversial monopod has also been dropped. Its value was always ful and it was an expensive item to make. If there is a need to use small mortars as precision weapons they need to have a full mortar mounting in the same way as do some of the 60mm models, however mm has such a short range that a trained man can easily hold the and make the necessary adjustments by eye and touch.

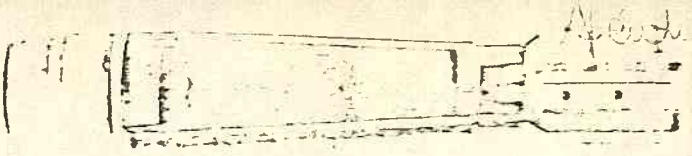
ammunition has remained almost unchanged except for a shorter in the s e bomb. One area which will demand some investigation very long is the fuzing of the HE round. The present fuze is not only is also ballistically inefficient and arms at the muzzle.

maximum range of 700 metres is achieved with a propellant car- containing 72 grains of ballistite. 700 metres is probably the furthest simple mortar of this type can be expected to fire with a reasonable e of accuracy and consistency. Beyond 700 or 800 metres it nes necessary to have a rigid bipod mounting and a fairly complicated There is also the difficulty of the mortarman locating his fall of shot. d, this can be hard enough at 700 metres where there is plenty of at the target end. But the main use of this small mortar is to throw up nating bombs for night fighting. It provides the infantry platoon with a s of immediate close-range illumination under the direct control of the n commander, with the added bonus of other natures of ammunition the situation demands them.

se small mortars can be looked on as being sophisticated and ved grenade launchers since they are little more complicated than such launchers, but in fact they offer much more in performance and rger and more lethal ammunition while remaining in comparative quite cheap. The 51mm is at present alone in its class and well ahead st of the 60mm types which are larger and heavier for only slightly performance.

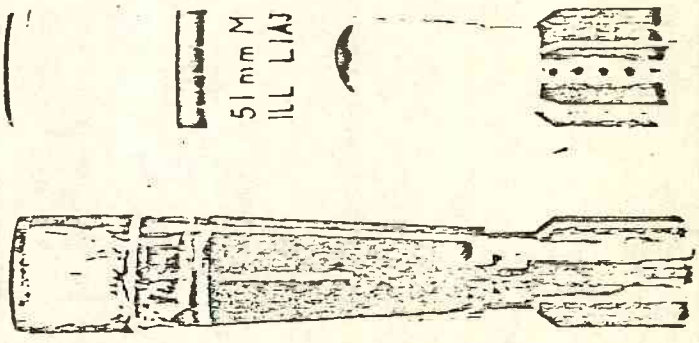
most interesting part of the design is probably the means adopted to ve the minimum range of 150 metres. This is a short range insert is dro into the barrel from the muzzle. It is a rod with a long firing ong its gitudinal axis. The lower end of the firing pin rests on the pin in the breech piece and is driven forward when the mortar is fired. the bomb does not reach the bottom of the tube and the short range is ved by increasing the chamber volume and so reducing the working ber pressure at the same time there is a reduction in shot travel.

bomb is of advanced design and the high explosive body is pre-notched to produce fragments of optimum size. The smoke and illuminating bombs have also been proved.

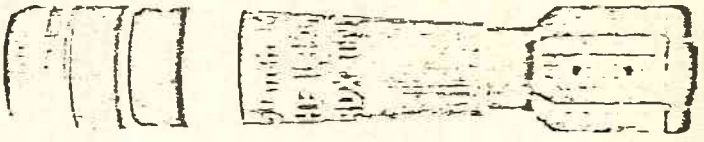


Sectioned view of the HE bomb

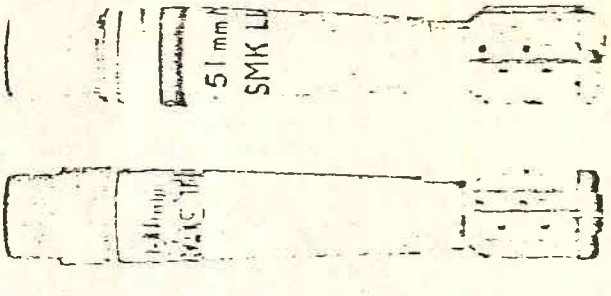
Sectioned view of the smoke bomb



Illuminating bomb in full and sectioned view



HE L1A1 bomb



Practice bomb and the smoke L1A1 bomb

MORTARS/UK

calibre: 51.25mm
weight: 1.5kg
length overall: 700mm
outside diameter: 55mm
h piece assembly: weight: 99g
length: 155mm
unit weight: 36g
pod support weight: 48g
-overall length folded: 207mm
extended: 420mm
late weight: 76g
mb 1A1:
t: 79g
h: 272mm
nuzzle velocity: 106 m/s
ange: 800m
um range: 150m

Filling: 60 40 RDX/TNT
Fuze: L98E2 point detonating, delayed arming fuze is said to be under development. Not intended for British service, sales only
Smoke Bomb L1A1: This has the same body as the HE round but without the fragmentation coil. Filling is Hexachlorethane and smoke duration is 120s. Delay time has been reduced to 6s to improve time of build-up of smoke cloud
Illuminating L1A3: Same body as the smoke bomb. Burst height at 800m is 250m, rate of descent 5m/s. Duration of burning about 30s. Output 250,000 candle power peaking to 400,000 for 12s. Full production starts spring 1981
Practice Bomb: All plastic, designed to be either for drill or for firing. Range 80m and easily recoverable from normal ground. Likely to last for at least 20 firings on grassland

Manufacturer: Royal Ordnance Factories
Status: Current. In pre-production
Service: Coming into service with the British Army. Much sales interest

TRADUCCION - APENDICE

Mortero de 51 mm.

Ha sido diseñado para reemplazar el mortero de 2 pulgadas (qv) La producción de este mortero ha llevado mucho tiempo y despues de 10 años llegó a su finalización.

El cilindro es un tubo de acero, acampanado en la boca para ayudar así a cargar las bombas y también para agregar resistencia al extremo vulnerable del cilíndro. Este cilíndro se atornilla en la recámara donde está el mecanismo de disparo. El nuevo mecanismo de disparo que posee es una modificación del viejo el cuál proporcionó un excelente servicio en el viejo mortero de 2 pulgadas, pero se hicieron algunas mejoras en los componentes aunque el principio de la operación es exactamente el mismo. El mecanismo de disparo es operado con una palanca corta que suelta un perno cuando se desvía hacia el centro.

La mira ha sido conderablemente simplificada y un cambio que será bienvenido por los usuarios es el abandono del nivel cruzado. Este no tiene verdaderamente lugar en tales morteros pequeños y solo mejora ligeramente la exactitud.

El valor del soporte monopod fue siempre dudoso y caro para hacer. Si hay necesidad de usar estos morteros pequeños como armas de precisión, necesitan tener un bípode completo de mortero montado en la misma forma que algunos de los modelos de 60 mm., sin embargo el de 51 mm. tiene tan corto alcance que un hombre entrenado puede sostener fácilmente el cilíndro y hacer los ajustes necesarios a ojo.

La munición ha permánecido casi sin cambio excepto por un retardo más corto en la bomba de humo. Una de las áreas que demanda investigación es la espoleta del proyectil HE.-

La espoleta actual no sólo es vieja, es también balísticamente ineficiente.

Se logró el máximo alcance de 700 metros con un cartucho propulsante conteniendo 72 granos de balistita. 700 metros es probablemente lo máximo que se puede esperar de un simple mortero de este tipo , para disparar con una chance razonable de e exactitud y consistencia, Más allá de los 700 a 800 metros, es necesario tener un bípode rígido montado y una mira regularmente complicada.
Existe también la dificultad del operador del mortero cuando falla el disparo. Verdaderamente, esto puede ser lo suficiente duro en 700 metros donde hay mucha cobertura en el extremo del blanco.
Para el uso principal de este mortero pequeño es lanzar bombas

de iluminación para luchas durante la noche. Les proporciona a los pelotones de infantería un medio de iluminación de corto alcance bajo el control directo del comandante del pelotón con la ventaja de poder emplear otras municiones cuando la situación lo demanda.
Estos pequeños morteros son simples lanzadores de granada mejorados y son un poco más complicados que algunos otros lanzadores pero ofrecen mucho más en perfomance y el proyectil es más grande y la munición más letal mientras permanecen en términos comparativos más baratos. El de 51 mm. es por ahora el único en su clase y permanece a la cabeza dela mayoria de los de 60 mm., los cuales son más grande y pesados.

La parte más interesante del diseño es probablemente el medio adoptado para lograr el alcance mínimo de 150 metros. Esta es una inserción de corto alcance el cual entra en el cilíndro desde la boca. Es una vara con un perno largo de fuego en la recámara y se mueve hacia adelante cuando se dispara el mortero. Así la bomba no llega al fondo del tubo y el corto alcance se logra aumentando el volumen de la cámara y reduciendo así el trabajo de presión en la cámara, al mismo tiempo en que hay una reducción de la travesía del disparo.

La bomba es de un diseño avanzado y su cuerpo explosivo está pre-recortado para producir fragmentos de medida óptima.

53

Mortar system

81 mm medium mortar

The British 81 mm mortar system provides unequalled performance together with operational and logistic economy. It is the only weapon system of its kind which offers exceptional range, great accuracy, maximum lethality, high sustained rate of fire, and great strength coupled with low weight.

Because of its exceptional range, it can very often carry out tasks which would otherwise require the use of field artillery. Because of its accuracy, far less ammunition is needed to deal with a given target.

The mortar and its ammunition are in general world-wide use by the British Army, and both have been thoroughly tried and tested on active service. The system has also been adopted by other armies throughout the world.

Mortar

To stand up to the exacting conditions of battle and to provide a high sustained rate of fire, a mortar must be of great strength and capable of withstanding extreme heat. At the same time, it must be as light as possible to permit rapid movement to battle positions and easy portability in difficult terrain.

The British mortar, shown opposite, has a barrel of high-strength steel with cooling fins to dissipate heat, so that it can withstand prolonged firing at maximum charge.

The bipod mounting is of special steel and light alloy construction for maximum strength combined with lightness. It is designed so that one man can lay the mortar, the elevating and traversing mechanisms being sealed for long life and low maintenance.

Vehicle mounting is possible.

The baseplate, forged in light alloy with four deep webs, gives good support, combining great strength with low weight.

The sight provides great accuracy. The whole unit can be carried in three one-man loads, of which the heaviest is only 12·3 kg (27 lb).

Ammunition

On these two pages the mortar itself is described; its ammunition is dealt with elsewhere in this Catalogue.

Specification

Range
4500 m (4900 yd) with standard charges
Up to 5650 m (6180 yd) with charges 7 and 8

Accuracy
0·5% probable error in range
1½ mils in line

Rate of fire
15 rounds/min up to charge 8 indefinitely with standard UK bombs.

Lethality
Over 40% of bomb body forms lethal-size fragments (many other types achieve little over 20%)

Weight and mobility
35·4 kg (78 lb) without sight
Three one-man loads, heaviest 12·3 kg (27 lb)

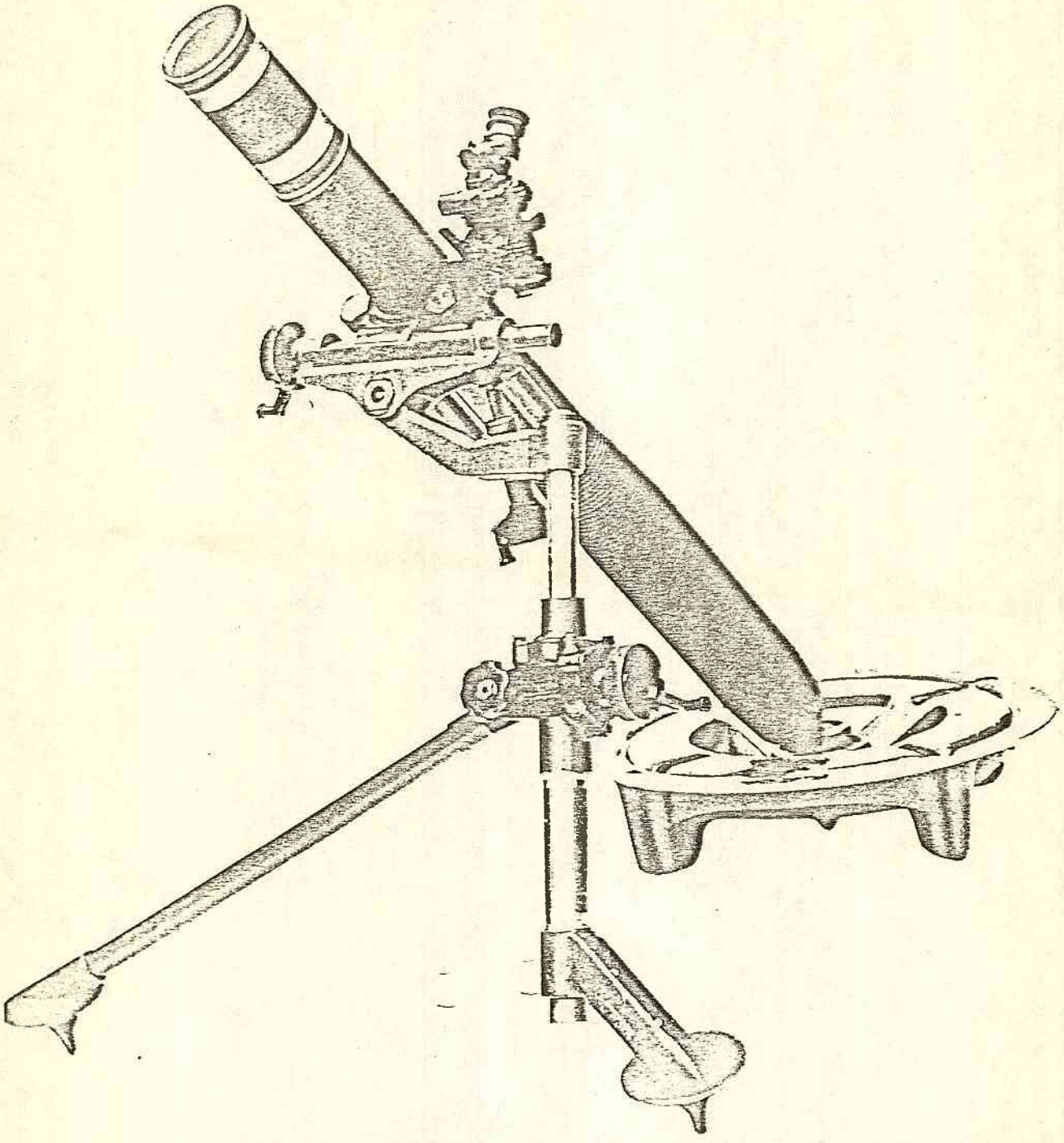
Barrel
Weight: 12·3 kg (27 lb)
Overall length: 1280 mm (50·3 in)
Outside diameter: 86 mm (3·4 in) muzzle end
Outside diameter: 94 mm (3·7 in) breech end
Calibre: 81 mm

Bipod mount
Weight: 11·8 kg (26 lb)
Overall length (folded): 1143 mm (45 in)
Elevation range: 45–85 deg (800–1515 mils)
Traverse range: 100 mils left and right of zero at 45 deg (800 mils) elevation, increasing to 325 mils left and right of zero at 85 deg (1515 mils)

Base plate
Weight: 11·4 kg (25 lb)
Overall diameter: 546 mm (21·5 in)
Socket size: 508 mm (2 in)

Sight unit C2
Weight: 1·25 kg (1 lb 12 oz) sight only, 5 kg (11 lb) including case. A Trilux modification for illumination can be provided

Mobile operation
Special mounting allows mortar to be fired from British armoured personnel carrier (FV432)



The 81 mm medium mortar and the ammunition for it (described elsewhere in this Catalogue) are made by Royal Ordnance Factories

...achine gun ...e. All weap...

ROYAL ORDNANCE FACTORIES
Ministry of Defence—Defence Sales Organisation
Imperial House, 23–25 Soho Square, London, Great Britain, W1V 5FJ
Telephone: 01-632 3333

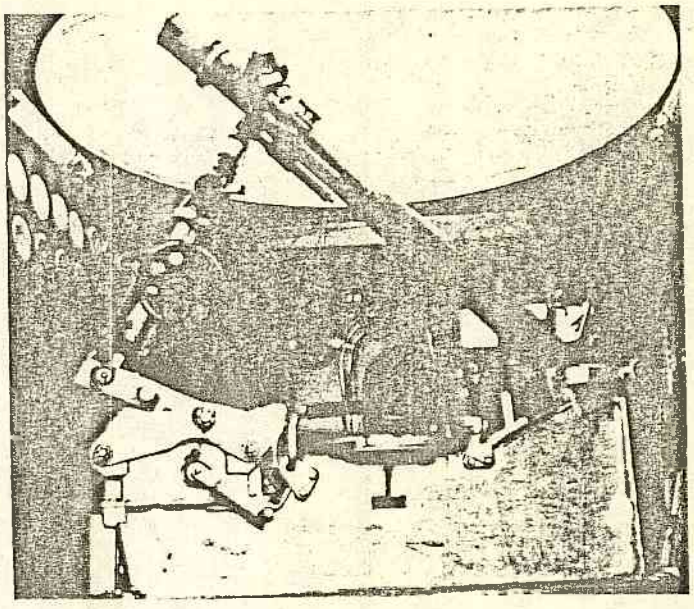
Appendix 16

ORTAR, ML 81mm L16

The 81mm Mortar has been a great success. It has greatly extended the ntry ability to produce their own support by providing both an increased ge over the 3in mortar and a bomb with an increased lethality. It has en shown to be both more accurate and more consistent than its pre- essor with the added advantage to the user of being lighter and more ily handled.

is being considered by the US Army as a possible replacement for the 9A1 and extended trials were taking place at the time of going to press.

is normally deployed as part of a section used conventionally in a pared position on the ground. It has also been developed to be fired from FV 432 which greatly increases its immediate mobility and enables edy movement to another site at the conclusion of an engagement. It be carried in a Land Rover and when necessary it can be broken down three loads of 25, 26 and 27lb (11.3, 11.8 and 12.25kg approximately) ich can be carried by the mortar section.



81mm mortar mounted in FV 432

RREL

To enable the mortar to fire bombs with the hot propellants used by some TO countries, a barrel slightly heavier than that originally specified was opted. Firing the British bomb, the mortar can fire 15 rounds a minute definitely, the barrel temperature reaching an equilibrium value of 000°F (540°C). This is believed to be a considerably better performance an can be obtained from any other mortar of this calibre. It can be argued at this is a performance that will never be required under the conditions of obile warfare envisaged in the future; but since the predictions of the perts have a disquieting habit of being wrong, it could be that in the future, in the past, the ability of a mortar to produce a large volume of fire in a ort space of time will be of great importance.

The barrel is made from a forged steel tube which has been reduced in ameter at the bottom and to save weight it has been screw threaded internally for the insertion of a breech plug. The lower half of the barrel has been finned to increase the surface area available for heat dissipation, and the top half of the barrel has been left plain. There is a collar at the mouth of the barrel to strengthen the section there and a small internal taper is provided to assist in loading the bomb.

BREECH PLUG

This fits into the barrel at one end and has a ball shape to fit into the socket of the baseplate. It carries a longitudinal hole screw threaded to take the firing pin.

MOUNTING

This is of unusual shape and has been referred to as a 'K' mount. The shape was adopted because with the elevating screw incorporated in one of the legs there is a significant weight saving and no loss of function. All the screw threads associated with elevation and traverse of the mortar have been enclosed and this reduces wear and increases life.

BASEPLATE

This is of Canadian design and is of forged aluminium. The design was produced by the Canadian Armament Research and Design Establishment. It is light and handles easily and is strong enough for the equipment. It produces an adequate flotation area and the design of the web prevents any tendency for the plate to slip sideways. The circular baseplate allows all round traverse without need to disturb the plate.

SIGHT

This is the Canadian C2 sight. It fits not only the mortar but also the General Purpose Machine Gun for use in the sustained fire role. It allows either direct laying or indirect laying using a 45 degree angled telescope of some 1.7 magnification. The sight is illuminated for night use with a tritium source.

AMMUNITION

The mortar has a high explosive round, the L15A3, fitted with Fuze No 162. It was planned initially to develop a VT fuze but the various economy cuts that have been introduced since the mortar was first projected have eliminated these. The US and Norwegian Kongsberg VT fuzes have been studied, and the virtues of such a fuze and the increased anti-personnel efficiency that they bring are well appreciated, but the cost is likely to prevent significant advance in the near future.

The standard HE bomb is of a highly streamlined shape and has been designed to produce the maximum number of fragments of the optimum size, which is considered to be 10-50 grains (0.6-3.2g). A study of cast iron, forged steel, and spheroidal graphite cast iron, showed the third to be the best material. The 81mm bomb has also gained in velocity and consistency from the incorporation of a sealing ring. This allows adequate windage as the bomb drops down the tube but the pressure produced by the burning propellant forces the macrolan ring outwards against the interior wall of the mortar tube and so prevents gas leakage. The ring also centres the bomb to prevent the yaw at the muzzle associated with conventional mortars and which leads to both inaccuracy and inconsistency. The ring also, by preventing the escape of hot gas past the bomb in the bore, reduces the barrel temperature and allows more bombs to be fired at the selected rate.

The ROFs have now developed a successor to the L15 bomb in the form of the L31E3 bomb. This is a slightly simplified design of body, though still using the same type of iron and it gives 8% better fragmentation. Ballistically it is unchanged and by altering the single nose adaptor a wide variety of fuzes can be fitted.

The L15 bomb had a complicated series of secondary charges for range increments and with the introduction of the L31 bomb the opportunity has been taken to design a new series of charges. There are now six secondaries of equal size, clipping on to the tail of the bomb in the same way as did the previous ones. Maximum range of the L31 bomb has gone up to 5,000m and the task of the loader is much easier.

The Royal Armament Research and Development Establishment is designing new fuzes for the L31 bomb.

The white phosphorus smoke bomb has been highly successful. It has the same weight and shape as the HE bomb and so eliminates the need for false ranges to be set for smoke.

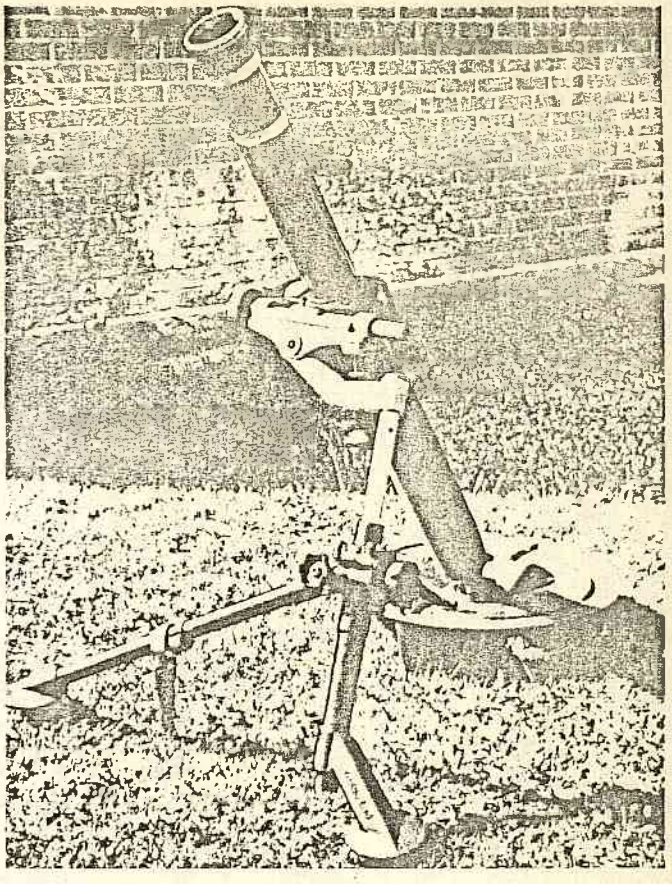
The illuminating bomb has become more important in recent years and provides the infantry with their best source of white light for the night engagement of enemy troops and armour. The Thomson-Brandt Mk 68 has been used for some years and the recent failure of a RARDE design has meant that it is likely that the French round will continue to be bought. Thomson-Brandt have now developed an illuminating round with a better illuminating candle and a range of 5,000 metres. This satisfies all the requirements of the British Army.

The celluloid containers for the augmenting charges have been found to be rather too brittle in cold weather and various alternatives are now being tried. At the same time the number of these charges is being reduced to simplify the task of detachment.

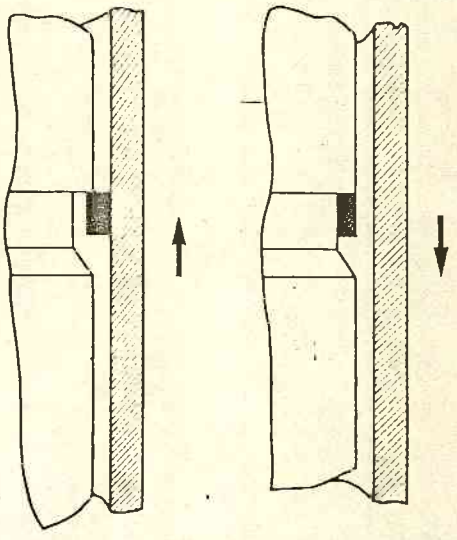
DATA

Barrel OML L 16
Weight: 11.88kg
Overall length: 1,270mm
Outside diameter: (1) Muzzle: 86mm
(2) Breech: 94mm
Calibre: 81mm
Construction: Steel monobloc forging

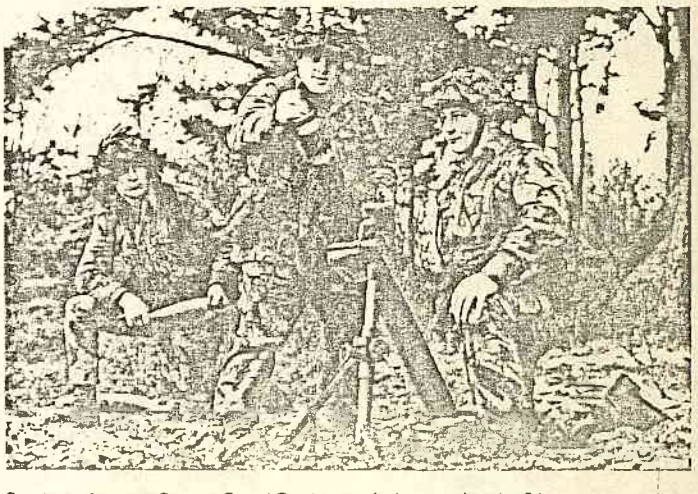
Mounting L5A5
Weight: 11.36kg
Overall length (folded): 1,143mm



ML 81mm mortar



Sealing ring is driven out to close the windage gap when the pressure is developed

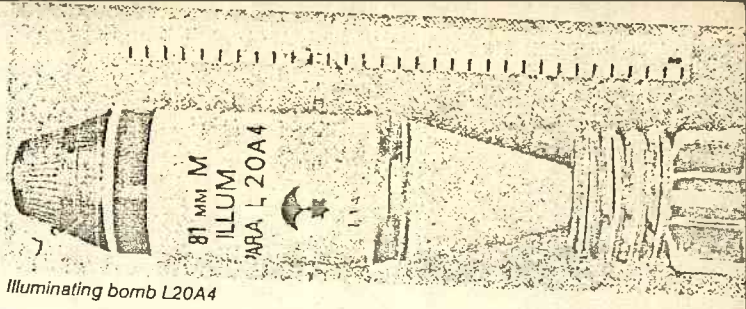


Soldiers of the 1st Bn, the Royal Regiment of Wales, using the 81mm mortar

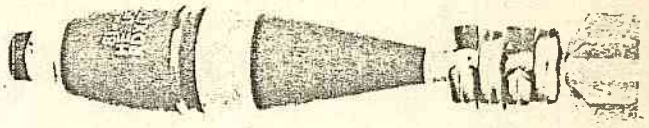
Traverse: 5° left and right of zero at 45° elevation (89 mils right and left at 800 mils elevation)
Elevation: Minimum 45° (800 mils)

Weight: 11.36kg
Diameter, overall: 559mm
Socket size: 50.8mm
Construction: Forged aluminium alloy

Ammunition:
HE Bomb L15A3 (to be replaced by L31E3 bomb)
Calibre: 81mm
Fuze: No 162 or L35
Length overall: 510mm
Weight complete: 4.26kg
Bomb body weight: 2.45kg
Tail weight: 0.27kg
Filling weight: 0.68kg
Filling: 60/40 RDX/TNT
Construction:
Body: Cast
Tail: Extruded light alloy
Propellant: NC porous discs in celluloid containers



Illuminating bomb L20A4


Bomb, HE, L15A1

Smoke Bomb L19A4
This has the same body and tail as the HE Bomb L15 and ranges are the same. Filling, white phosphorus. Fuze 162. Weight complete 4.26kg.

Illuminating round
Thomson-Brandt Mk 68. Fuzed F.H. 81. Rounds are issued complete with Charge 5.

Bomb, smoke, L19

Performance: HE round

	Augmenting Cartridges			Muzzle velocity (m/s)		Range (Metres)		50%
	Small	Intermediate	Large	L5 Mounting	FV 432	Minimum	Maximum	Zone (metres)
Primary	0	0	0	73	73	180	520	15×2
Charge 1	1	0	0	110	110	390	1120	30×5
Charge 2	2	0	0	137	139	580	1710	30×5
Charge 3	3	0	0	162	163	780	2265	30×5
Charge 4	3	1	0	19t	197	1070	3080	40×10
Charge 5	3	2	0	224	227	1340	3850	50×15
Charge 6	3	3	0	250	255	1700	4680	60×20
Charge 7	1	0	4			1900	5255	
Charge 8	1	0	4			2100	5660	

Performance: Illuminating round

Charge	Cartridges	MV m/s	Range (m) Min	Max	50% Zone (m) L	W	H
Charge 1	1	125	100	1000	35	20	30
Charge 2	2	158	700	1700	35	20	40
Charge 3	3	186	800	2200	35	20	45
Charge 4	4	212	1000	2700	40	25	55
Charge 5	5	236	1200	32p0	55	30	60

New H-B bomb gives maximum range of 5,100m

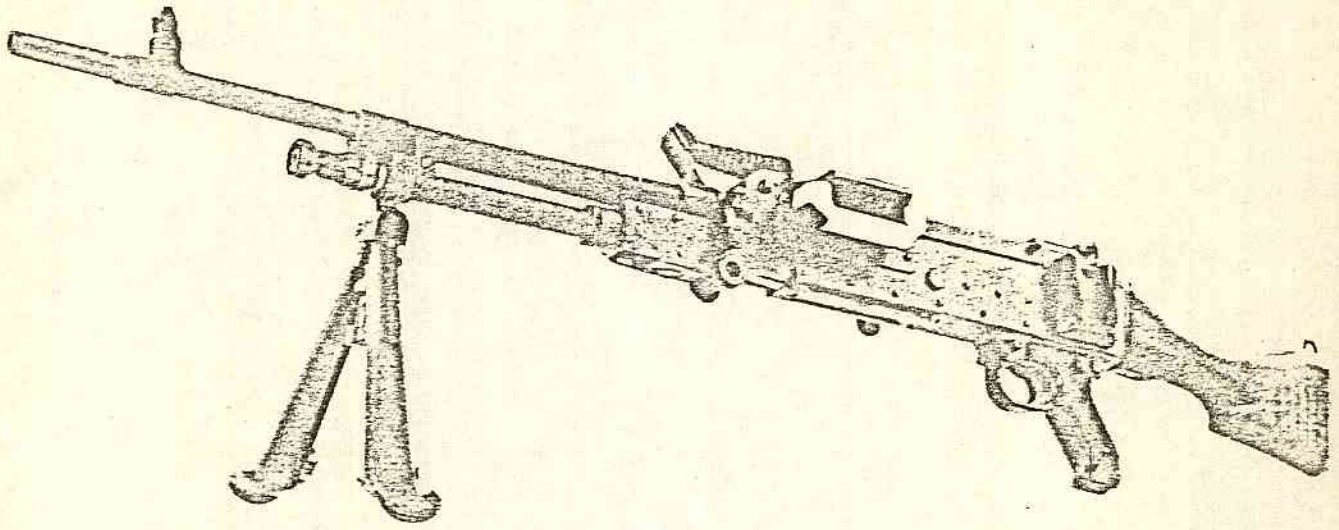
Manufacturer: Royal Ordnance Factories
Status: Current. In production
Service: British Army, also: Austria (designation 8cm Granatwerfer 70), Bahrain, Canada, Guyana, India, Kenya, Malawi, Malaysia, New Zealand, Nigeria, Norway, Oman, Qatar, United Arab Emirates and North Yemen

Apendice 17

Machine guns

for infantry and armoured fighting vehicles

The Royal Ordnance Factories organisation has developed a new machine gun and several variants, each adapted to a specific purpose.



L7A2 machine gun

The gun is designed for general infantry use, and can serve either as a light machine gun (LMG) or as a sustained fire machine gun (SFMG). In the light machine gun role it is fired from the bipod, in the sustained fire machine gun role it is fired from the tripod mounting. Gun and team can be transported in an armoured personnel carrier, from which the gun can be fired using a special mounting provided on the armoured personnel carrier.

The gun is a fully automatic, belt-fed, gas- and spring-operated, air-cooled weapon capable of a sustained high rate of fire in bursts. It is fed from left to right using factory-filled disintegrating link belts of 200 rounds. Links can easily be joined or parted to give the required length of belt. Empty links can be refilled by hand for use in an emergency, or when required for training purposes.

The gun is designed to fire at a cyclic rate of fire of approximately 750 rounds per minute. The cyclic rate of fire is controlled by a gas regulator, and with the regulator set at maximum gas the rate of fire is at least 900 rounds per minute.

When the gun is fired from the tripod, targets can be engaged over a fairly wide area in quick succession. Its great accuracy, together with the instruments provided, allow the gun to be fired effectively through smoke or fog, or during the hours of darkness.

Specification

Type: L7A2
Cartridge size: 7·62 × 51 mm
Operation: gas, automatic
Method of locking: dropping locking lever
Feed: belt

Weights
Gun in LMG role: 10·9 kg
Barrel: 2·73 kg
Ammunition (100 rounds linked): 2·95 kg
Wallet, spare parts and tools: 1·02 kg

Lengths
LMG: 1232 mm
SFMG: 1048 mm
Barrel (includes 50 mm overhang of carrying handle)
With flash hider: 679 mm
Without flash hider: 597 mm

Mechanical features
Barrel regulator: escape to atmosphere type, 10 positions
Barrel cooling: air, quick change
Foresight: blade
Rearsight: aperture
Sight radius: LMG role (sight down) 851 mm; SFMG role (sight up) 787 mm

Firing characteristics
Muzzle velocity: 838 m/s
Rate of fire, cyclic: 750–1000 rounds/min

Accessories
50-round, belt feed box. Blank firing attachment L3A1 with blank ammunition guide plate. Cover muzzle 7·62 mm MG L1A2. Wallet, spare parts, filled. Chest, carrying, 7·62 mm Mk 1
Manufacturer: Royal Small Arms Factory, Enfield
Status: current. Production complete
Service: British and some Commonwealth forces

7.62mm L7A1 AND L7A2 GPMGs

The British Army ended the Second World War with the Vickers MG Mk 1 as its sustained fire weapon and the Bren gun as the section LMG. Both guns used the .303in cartridge, the Vickers employing the Mk 8Z and the Bren the Mk 7.

When the NATO 7.62mm round was Introduced the opportunity was taken to select a General Purpose Machine Gun. After long trials the Belgian MAG was chosen and built under licence at the Royal Small Arms Factory, Enfield. Several minor changes were made to the design to accept British manufacturing methods and material specifications, but the essential dimensions, features and functioning of the gun are identical to those of the Belgian MAG. However, parts are not interchangeable between Belgian and British guns.

A Drill Purpose (inoperative) version of the weapon has been produced and is designated L46A1.

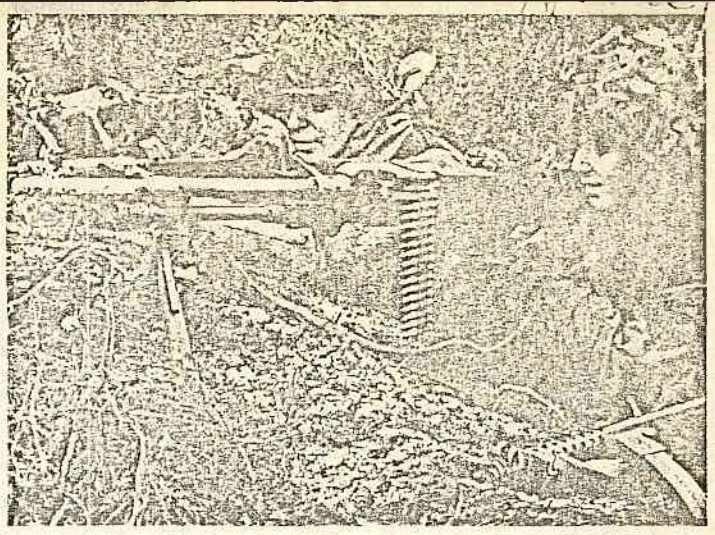
DATA (L7A2)
Cartridge: 7.62mm × 51
Operation: Gas, automatic
Method of locking: Dropping locking lever
Feed: Belt

WEIGHTS
Gun in LMG role: 10.9kg
Barrel: 2.73kg
Ammunition (100 rounds linked): 2.95kg
Wallet, spare parts and tools: 1.02kg

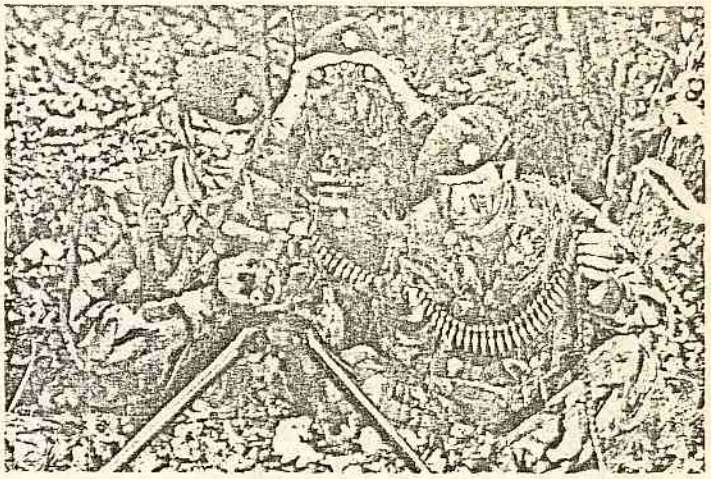
LENGTHS
LMG: 1,232mm
SFMG: 1,048mm
Barrel (includes 5cm overhang of carrying handle)
With flash hider: 679mm
Without flash hider: 597mm

MECHANICAL FEATURES
Barrel: Regulator: Escape to atmosphere type. 10 positions.
Cooling: Air. Quick change
Sights: Foresight: Blade
Rearsight: Aperture
Sight radius: LMG role (sight down) 851mm; SFMG role (sight up) 787mm

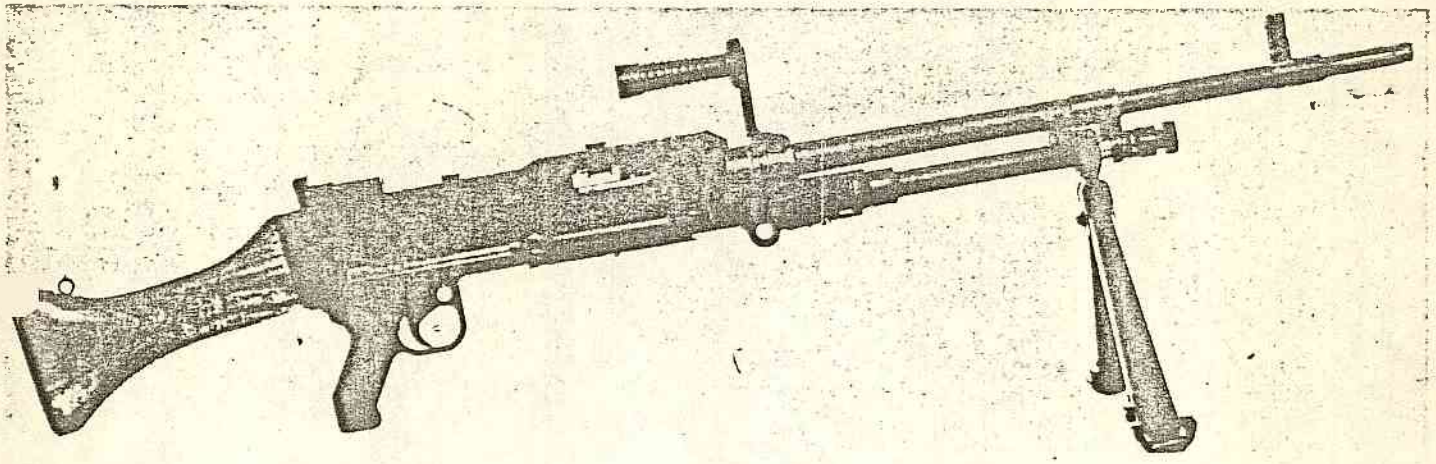
FIRING CHARACTERISTICS
Muzzle velocity: 838 m/s
Rate of fire: Cyclic: 750-1,000 rounds/min



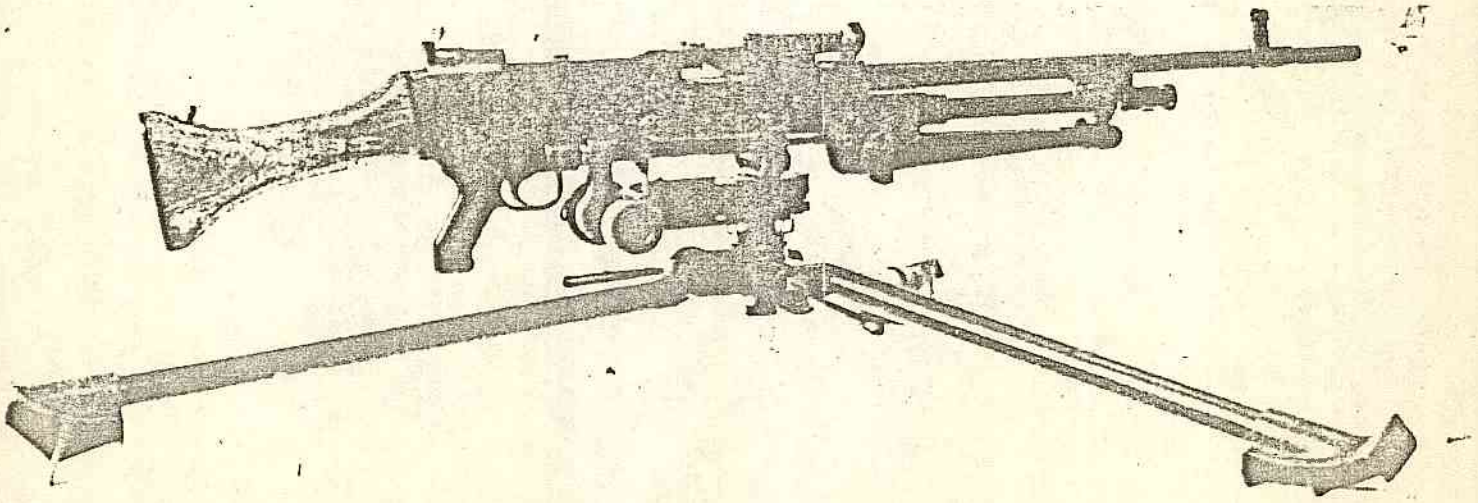
L7A2 GPMG in light role



GPMG in the sustained fire role, mounted on the L4A1 tripod. The C2 dial-sight is on the gun, and the gunner does not need to look along the iron sights while firing. The detachment commander is using his binoculars to observe the fall of shot. This is a posed photograph. The gun crew would normally be well under cover



L7A2 GPMG



L7A2 GPMG in sustained fire role on tripod mounting 7.62mm MG L3A1

ACCESSORIES

50-round, belt feed box. Blank firing attachment L3A1 with blank ammunition guide plate. Cover muzzle 7.62mm MG L1A2. Wallet, spare parts, filled. Chest, carrying, 7.62mm Mk 1.

Manufacturer: Royal Small Arms Factory, Enfield, Middlesex
Status: Current. Production complete
Service: British and some Commonwealth forces

GPMG BUFFERED TRIPOD MOUNTING

To provide a strong and stable yet small and light mounting for the L7 GPMG the Tripod Mounting, 7.62mm MG, L4A1 was adopted at the Royal Small Arms Factory at Enfield. Details of this mounting are given below; but it should be noted that the RSAF have now produced basically similar mountings adapted for use with a wide variety of other machine guns.

The mounting incorporates its own recoil buffer unit, permitting all round traverse and has a quick release mechanism allowing free traverse, elevation and depression.

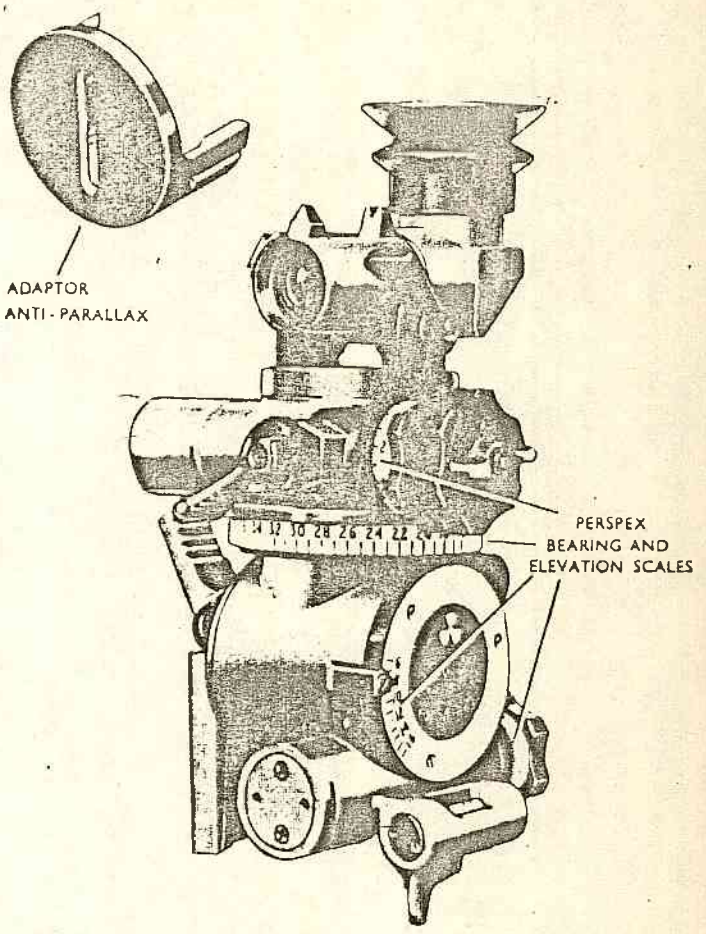
The tripod mounting consists of
Three legs – two short, one long
Tripod head
Cradle and recoil unit
Elevating mechanism
Traversing mechanism.

The three tubular legs support the tripod head. At the foot each leg has a shoe to give an improved ground grip. Each leg is locked by a cam lever which when pushed inwards secures the leg in any desired position. When the locking levers are pulled outwards the clutch faces are forced out by coil springs and the leg is free. The tripod can be set to 'high' or 'low' and these settings are notched on the legs and on the tripod head at the junction of the clutches. There are three lugs on the tripod head to take legs. The dial ring is held in position by friction and can be rotated by hand. It has a traverse scale of 0-3,200 mils in each direction with graduations every 250 mils, numbered every 1,000 mils. The indicator moves with the head and a line on it indicates the traverse on the scale. The cradle and recoil unit is mounted on the tripod head. The cradle is attached to the tripod head by a ball joint which can be locked; when free it allows 600 mils elevation and all round traverse. The gun is secured to the recoil unit by front and rear mounting pins. The cradle has an enclosed buffer system of tubes, buffers and springs. When the first round is fired, the whole gun recoils and then the buffer returns it to battery. Before run out is completed the next round is fired and thereafter the gun movement is extremely small as it rests in equilibrium imposed between the recoil force and the buffer unit.

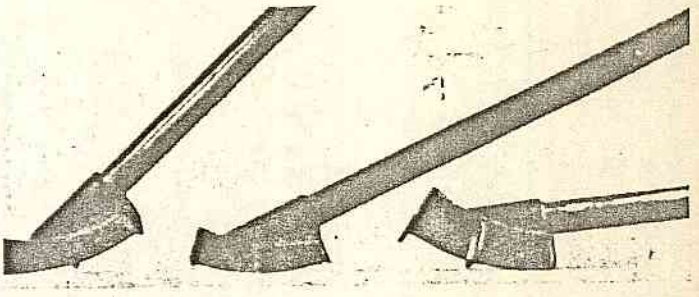
The elevation mechanism provides a fine adjustment using the handwheel on the left. It is controlled and locked by an eccentric cam tightened by a thumb lever. The fine traversing mechanism is controlled by the handwheel on the right. The range of controlled traverse is 200 mils and one turn of the handwheel traverses the gun through 6.6 mils. A clicker control operated by a sliding sleeve gives 2.2 mils to each click i.e. three clicks per turn. If desired the sleeve may be pushed in to give a smooth, silent control.

The dial sight is the 'Sight unit C2, Trilux' which is also used with the 81mm mortar. It has a right-angled telescope with a magnification of 1.7X and a field of view of 180 mils. The eyepiece may be rotated 1,600 mils (90deg) right or left from the vertical. The bearing assembly comprises the coarse and fine bearing scale rings and a worm gear. The coarse bearing ring has a scale reading from 0 to 6,400 mils (0 to 360 degrees) and is numbered every 200 mils clockwise. The fine bearing scale ring is assembled on the worm spindle and has a slipping scale graduated in single mils from 0-100 and numbered every 10 mils. The two bearing scales allow the gun to be laid onto a selected zero line and then bearings read off to the nearest mil from that zero line. The sight can then be locked if so required.

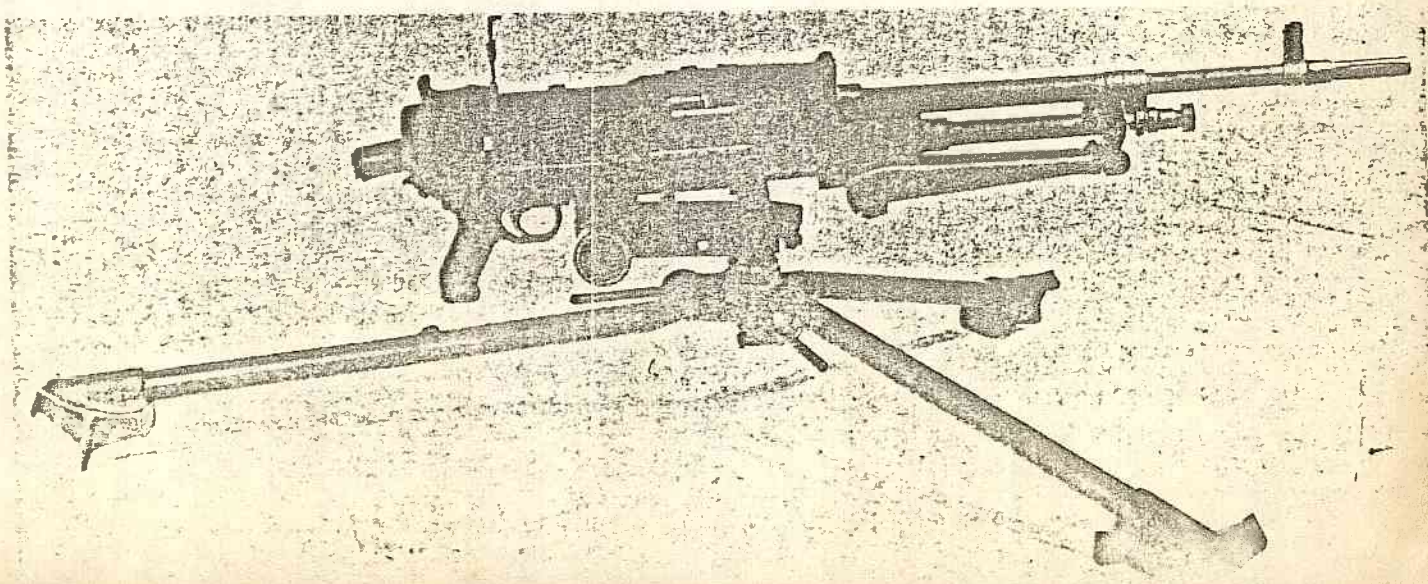
The elevation assembly has a coarse scale plate and a fine scale ring. A worm gear allows the completed sight unit to be rotated up or down and the



Sight unit, C2, Trilux and adaptor, anti-parallax



Contour of tripod feet, ensuring maximum anchorage on all types of ground from all tripod heights



gle of elevation can be read to the nearest mil. The worm gear can be locked in a similar way to that for bearing.

The elevation and cross levelling bubbles are mounted below their corresponding coarse scales.

The sight unit is fitted with perspex bearing and elevation scales which, with the telescope graticule and the levelling bubbles, are Trilux illuminated by sealed in beta sources, using Tritium gas, which lose half their brightness in 10 years.

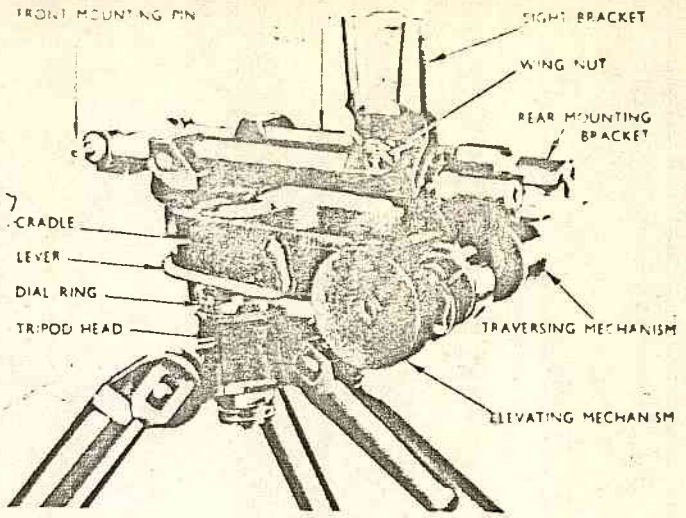
When the L7 machine gun is used on the tripod the butt is removed and the recoil buffer is employed in its place. This carries out the same function as the buffer assembly and carries the same braking cone and ring together with the Belleville compression washers as those on the buffer assembly of the gun in the LMG role.

DATA
Mounting: Tripod L4A1

WEIGHTS
Tripod: 13.61kg
Sight unit, cased: 2.58kg
Conversion kit, complete: 32.66kg

LENGTHS
Legs spread:
Distance across short legs: 1,118mm
Distance front to rear: 1,118mm
Height of sight line above ground: 330 – 635mm
Folded dimensions: 813 × 191 × 191mm

MECHANICAL FEATURES
Free traverse: 360 degrees (6,400mils)
Mechanical traverse (max): 11 degrees (200mils)
Clicker control (angle/click): 7mins (2.2mils)
Elevation (max): 22 degrees (400mils)



Cradle and recoil unit

Mechanical elevation (max): 2 degrees 48min (50mils)
Depression (max): 11 degrees (200mils)
Mechanical depression (max): 2 degrees 48 min (50mils)

Manufacturer: Royal Small Arms Factory, Enfield
Status: Current. Production complete
Service: British and some Commonwealth and foreign forces, principally those which have adopted the British-built GPMG. The L5A1 tripod (Australian and New Zealand service) is essentially the L4A1 adapted for the US M60 MG

Apendice 18

BREN GUNS

At the end of the First World War the British Army possessed large quantities of the Vickers MMG Mk 1 and the Lewis gun. In 1930 exhaustive trials were conducted to find a replacement for the Lewis. The choice finally fell on the Czechoslovak ZB 26, modified to fire .303in ammunition and with a slightly improved gas system. This became the ZB 30. The trials and modifications were completed in 1934 and the gun put forward to the War Office Acceptance Committee.

BREN .303 SERIES

When the acceptance committee were satisfied, arrangements were made for the production of the gun at the Royal Small Arms Factory at Enfield. The gun was named the BREN from BRno and ENfield. The gun was made by conventional machining from the solid and the first gun was finished in September 1937. By July 1938 production was 300 a week, rising to 400 a week in September 1939. By June 1940 more than 30,000 guns had been produced and issued.

The gun was manufactured only at Enfield. Magazines were manufactured by BSA and the Austin Motor Works. These gave trouble because they would only function with 29 rounds instead of 30. This was found to be a drawing error in the conversion from the rimless 7.92mm cartridge design.

After Dunkirk only about 2,300 Bren guns remained in England, and Enfield worked flat out to produce more. By 1943 production at Enfield had reached 1,000 guns a week. Production was started in 1940 by John Inglis in Canada and by the Lithgow Small Arms Factory in Australia which produced 150 guns a week by 1942. Inglis also manufactured the gun in 7.92mm for China. In 1952 the Inglis version of the Mk II Bren was manufactured in Taiwan as the M41 in .30-06.

The original gun was designated the Mk I. The Mk II gun had the same length barrel, a simplified rearsight, and the flash hider/gas regulator/front sight which was originally a single stainless steel fabrication was produced as three separate units with only the regulator in stainless steel. The bipod was made with non-telescoping legs and the handle below the butt was omitted. These changes to assist production increased the weight from 22lb 2oz (10.04kg) to 23lb 3oz (10.52kg). The Mk III simplified production, reduced barrel length, and also the gun weight was reduced to 19lb 5oz (8.76kg). The Mk IV had the shorter barrel and weight was reduced to the minimum compatible with the stresses imposed by the .303 Mk VII cartridge.

Remarkably, .303in Brens still appear and RSAF convert them to L4A4 or L4A3 according to the needs of the customer. The .303 guns are stripped, cleaned and gauged and any defective components are replaced. The gun is re-barrelled, tested and proof-fired. Whilst spares are made for the 7.62mm guns, none are made for the .303in.

7.62mm L4 BREN SERIES

When the decision was made to adopt the 7.62mm NATO round various conversions of the .303 Bren gun were made to adapt it for 7.62mm. These generally employed the breech-block made for the Canadian 7.92mm guns, with new barrels.

A brief summary of the L4 series follows:

L4A1: Converted Mk III .303 Bren. First known as the X10E1. Two steel barrels. Bipod Mk 1. Obsolescent.

L4A2: Converted Mk III .303 Bren. First known as the X10E2. Two steel barrels. Light bipod. Land and naval use. Obsolescent.

L4A3: Converted Mk II .303 Bren. One chromium plated barrel. Obsolescent for land service.

L4A4: Converted Mk III .303 Bren. One chromium-plated barrel. Current weapon all services.

L4A5: Converted Mk II .303 Bren. Two steel barrels. Obsolescent for land and air service. Still in naval service.

L4A6: Converted L4A1. One chrome-plated barrel. Introduced only for land service. Obsolescent.

L4A7: Conversion of Mk I .303 Bren. None made but drawings prepared for the Indian Army. One chrome-plated barrel.

OPERATION

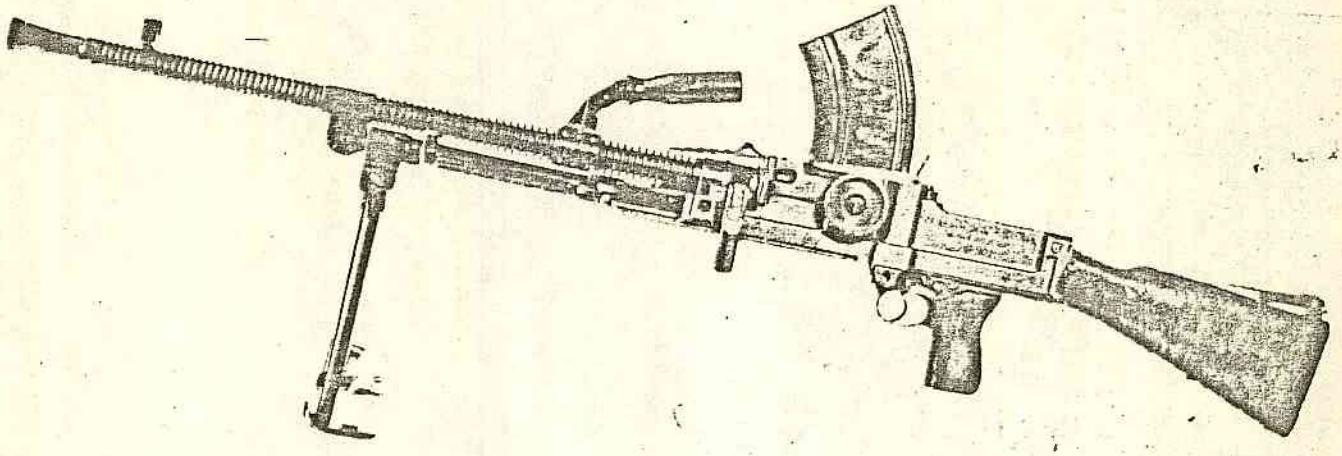
The Bren Light Machine Gun is a magazine-fed, gas-operated gun using a tilting block locking system lifting the rear end of the breech-block into a locking recess in the top of the body.

During the period of initial pressure build up, the body, barrel, breech-block, gas cylinder and bipod recoil on the butt slide approximately 6mm. The movement is buffered by the piston buffer and spring. When this energy has been absorbed the piston buffer spring reasserts itself and returns the body, barrel, cylinder and bipod to their normal positions on the butt slide. This recoil and run out of these assemblies reduces the shock experienced by the firer and makes for fewer breakages in the affected components.

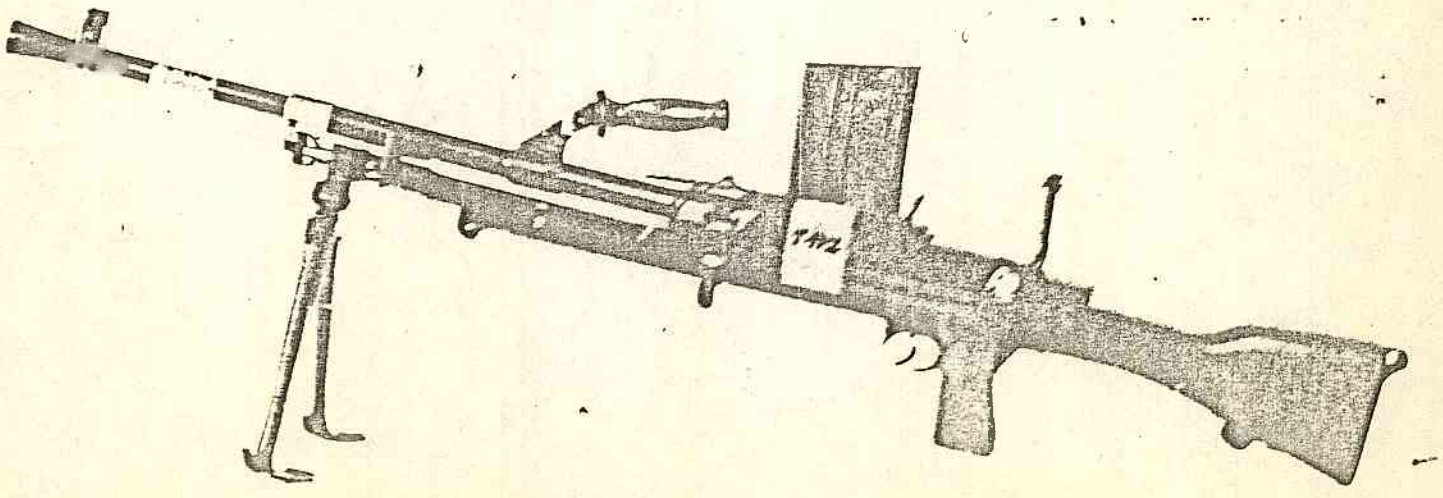
When the gun is fired the gases force the bullet up the bore and a small proportion of them is diverted through a tapping in the barrel, passes through the regulator and impinges on the piston head. The piston is driven back.

Attached to the piston by a flexible joint is the piston extension on which is supported the breech-block.

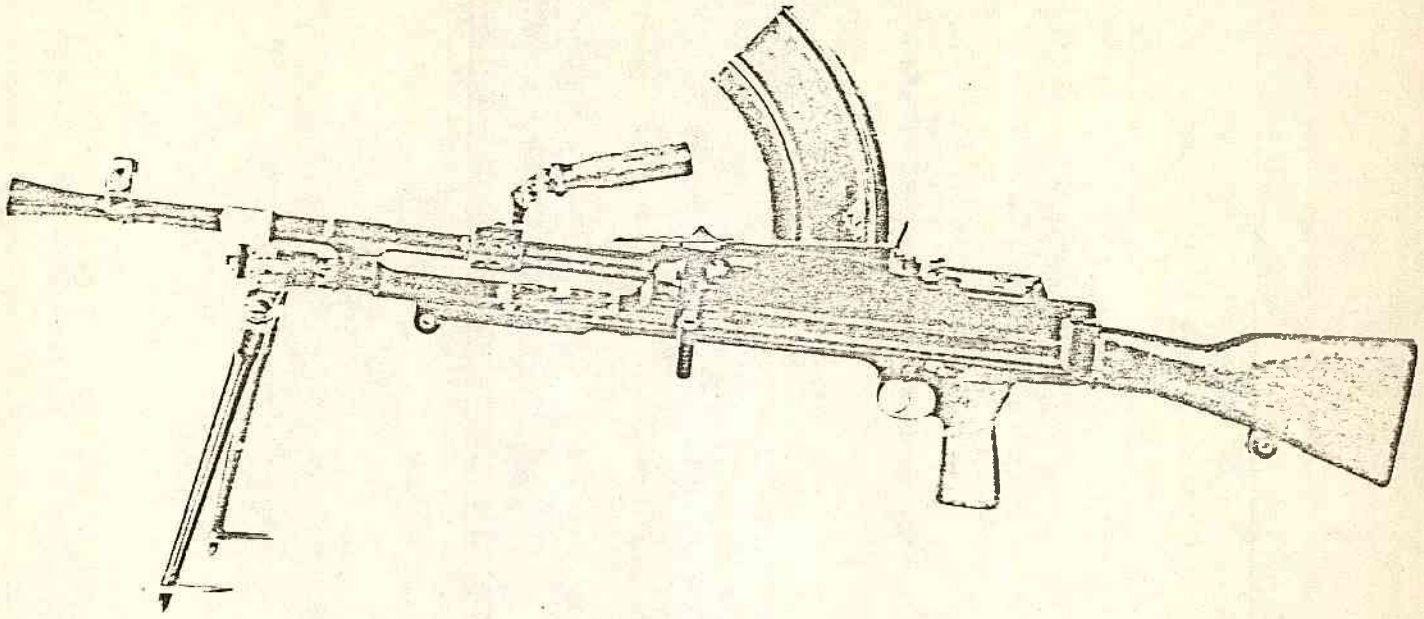
A piston post on the extension fits into the hollow interior of the breech-



303 ZGB 30



7.92mm by Inglis, for China



Bren Mk III

The gas regulator was installed in the Bren gun to give greater flexibility when the gun is firing under adverse conditions. The regulator has four tracks and a larger diameter gas track can be rotated into position as required. It should be noted that the gas impulse is applied only for a very short distance and then the gas escapes to atmosphere through vents bored in the cylinder walls. If excessive fouling occurs the bipod can be twisted and this cuts away any build up of carbon which is then dispersed by the next blast of gas. This feature produces an extremely reliable gun even after prolonged firing.

The barrel can be changed in a matter of seconds by raising the barrel latch and pulling the barrel forward using the carrying handle. With the gun fired at 120 rounds – four magazines – a minute, the barrel requires changing every 2½ minutes. The hot barrel can be cooled by air after removal from the gun or as often happened in action by laying it in wet grass or even in a stream.

TRIGGER MECHANISM

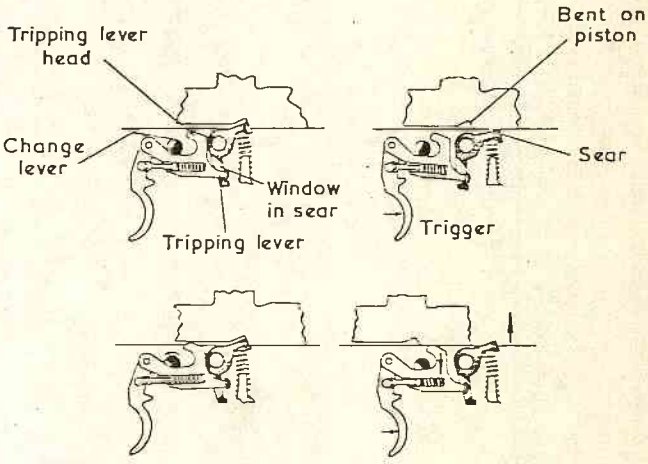
The weapon can be fired either at full automatic or at single shot. The latter facility is employed to conserve ammunition, prolong barrel life and for tactical deception. The sear has a window through which projects the tripping lever. When the change lever is rotated to 'single shot' the tripping lever bears against the upper surface of the window in the sear and its tripping head is raised into the path of the gas piston which depresses the tripping head as it comes forward. This forces the tripping lever down away from the sear window and the sear is released to rise and hold the piston to the rear. Releasing the trigger re-positions the tripping lever against the top surface of the sear window and operating the trigger fires one more shot. When the change lever is set to 'auto' the tripping lever is forced down to bear on the bottom side of the sear window and the tripping lever head is pulled down clear of the piston. The gun continues firing as long as ammunition remains in the magazine and the trigger is depressed.

MOUNTING

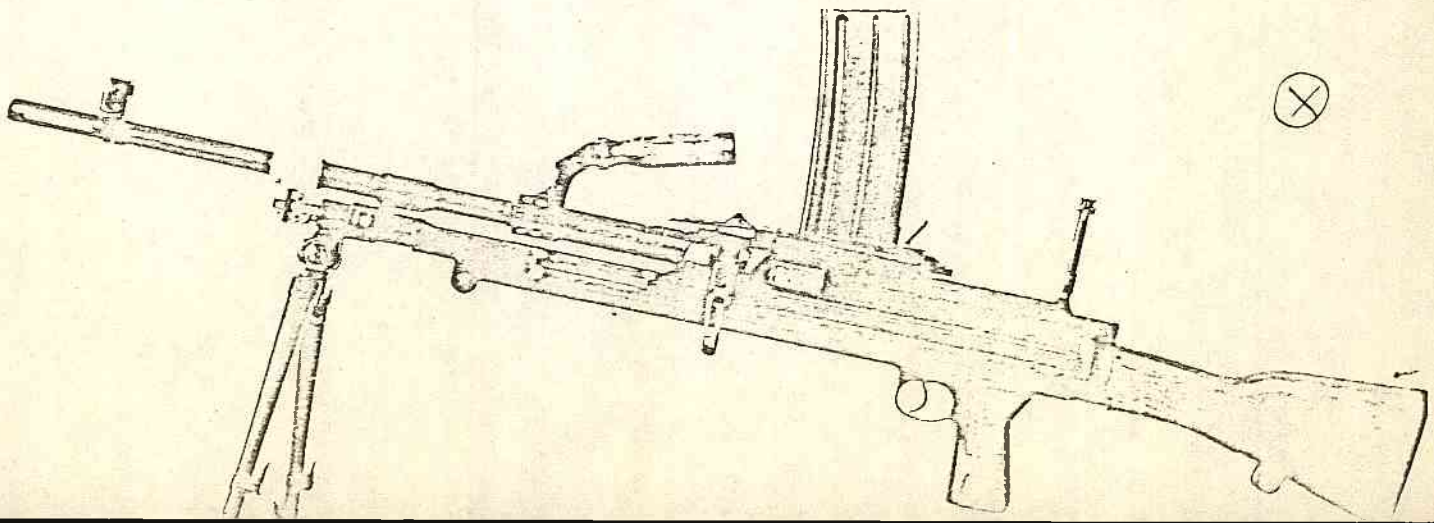
The gun is usually employed as a light machine gun using a bipod but during the war a tripod was available. This enabled the gun to fire on fixed lines and could also be adapted readily for anti-aircraft use. The Mk 2 and Mk 2/1 tripods were of Czechoslovak design. The 30-round box magazine was universal but had to be loaded with care as overlapping rims could cause stoppage. A 100-round high speed drum magazine was produced for anti-aircraft fire early in the Second World War but was not widely used because it was heavy, difficult to load quickly and also awkward to carry.

The Mk I gun had a tangent drum backsight but to simplify production a vertical leaf backsight was installed on subsequent marks.

The Mk I gun also had a handle under the butt for a left hand grip and a strap on the butt plate to rest over the shoulder. Both these features were abandoned for later marks.



Fire selector of Bren gun



STRIPPING
(1) Remove the magazine. Cock the action. Check chamber and feedway clear.
(2) Push body locking pin, at rear of body from left to right.
(3) Pull back the butt and trigger group.
(4) Pull back the cocking handle and remove the piston and breech block. Re-assemble in reverse order.

Mk I
Cartridge: .303 Mk 7
Operation: Gas, selective fire
Method of locking: Tilting block
Feed: 30-round box magazine

WEIGHTS
Gun: 10.04kg
Magazine, empty: 0.48kg
Magazine, full (30 rounds): 1.25kg
Magazine, drum (100 rounds) empty: 2.92kg
Magazine, drum (100 rounds) full: 5.41kg
Barrel, assembled: 2.85kg

LENGTHS
Gun: 1,156mm
Barrel (Mk I): 635mm

MECHANICAL FEATURES
Barrel: **Regulator:** 4 position
Cooling: Air. Quick change
Sights: **Foresight:** Blade
Rearsight: Aperture, drum operated arm
Sight radius: 788mm

FIRING CHARACTERISTICS
Muzzle velocity: 744 m/s
Rate of fire: Cyclic: 500 rounds/min
Effective range: 600m

Mk II
As Mk I except
Gun: 10.52kg
Barrel: 2.93kg
Rearsight: Tangent leaf. 200-1,800yds (1,646m) + 50yds
Sight radius: 782mm
Rate of fire: Cyclic: 540 rounds/min

Mk III
As Mk I except
Gun: 8.76kg
Barrel: 2.31kg
Gun: 1,090mm
Barrel: (Mk 4) 565mm
Rearsight: As Mk II
Sight radius: 694mm
Rate of fire: Cyclic: 480 rounds/min

Mk IV
As Mk III except
Gun: 8.68kg
Barrel: (Mk 5) 2.27kg
Rate of fire: Cyclic: 520 rounds/min

L4A4
As Mk I except
Cartridge: 7.62mm × 51
Gun: 9.53kg
Magazine, empty: 0.45kg
Magazine with 30 rounds: 1.18kg
No drum magazine
Barrel: 2.72kg
Gun: 1,133mm
Barrel: 536mm
Rearsight: As Mk III
Sight radius: 743mm
Muzzle velocity: 823 m/s
Rate of fire: Cyclic: 500 rounds/min

Manufacturer: Royal Small Arms Factory, Enfield; John Inglis Ltd., Toronto, Canada; Small Arms Factory, Lithgow, New South Wales, Australia
Status: Current. No longer manufactured
Service: British forces and many Commonwealth and former Commonwealth countries

Apendice 19

105 mm light gun

close support weapon

The range, mobility and fire power of this advanced light and robust equipment makes it ideal for use in tough limited war conditions in all climates.

A lethal punch is provided by the well-tried Abbot Mk 2 ammunition system. This includes a whole family of projectiles backed by a flexible multiple charge system which achieves ranges from 2500 to 17 000 m plus.

The weapon has two towing attitudes. For high speed, long distance, rugged terrain, aircraft and helicopter portage the folded attitude is recommended.

The elevating mass can be removed to give two light helicopter loads. The weapon can be reassembled with simple tools in less than 30 min.

The low silhouette and fast all-round traverse of this versatile gun help to give it an effective anti-tank performance with its HESH (high-explosive, squash-head) shell.

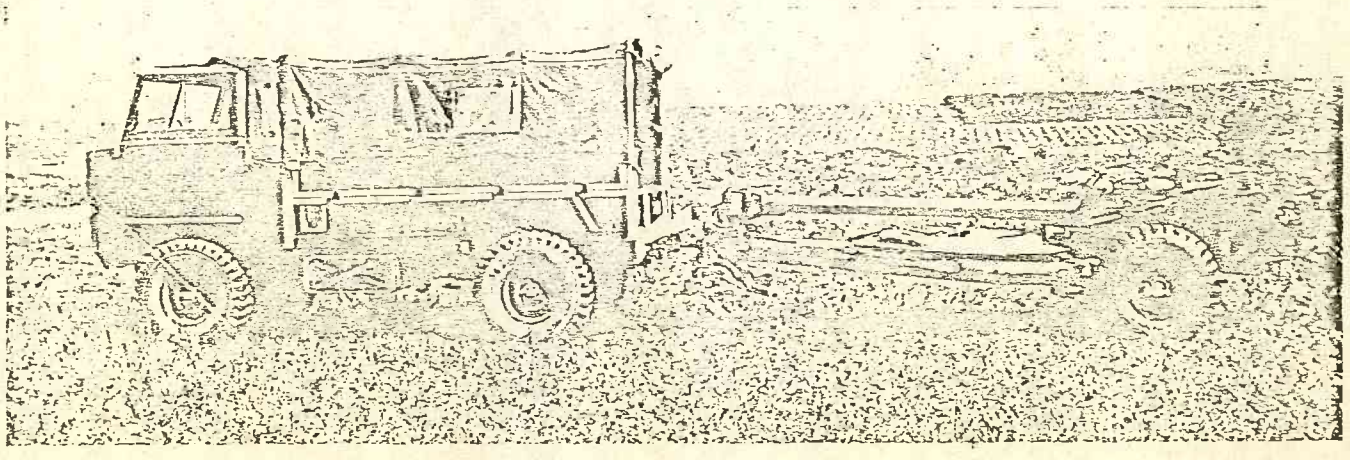
If required, the equipment can be linked into a fire control computer system, such as British FACE, which is described elsewhere in this Catalogue.

Specification

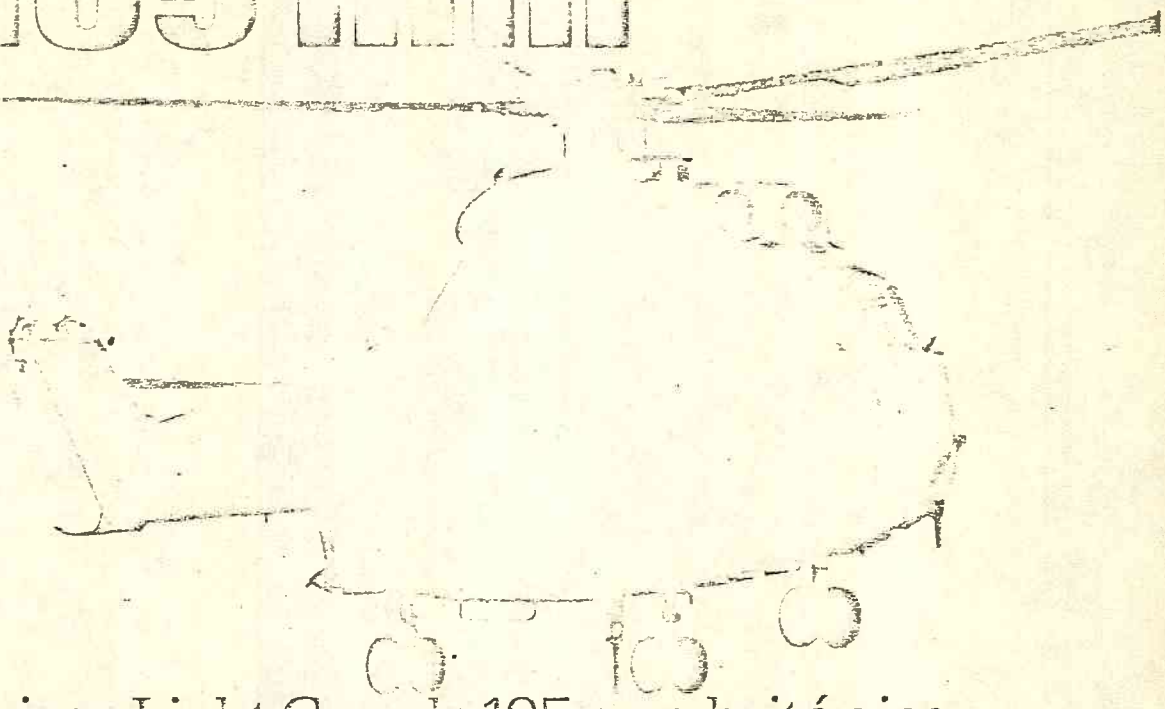
	Metric	British
Range—maximum	15·0 km with charge 5	9·38 miles
	17·0 km with supercharge	10·62 miles
minimum	2·5 km	1·55 miles
Total weight	1858 kg	4088 lb
Comprising—elevated mass	1063 kg	2338 lb
lower carriage and essential stores	794 kg	1750 lb
Rate of fire—burst	8 rounds/min for 1 minute	8 rounds/min for 1 minute
intense	6 rounds/min for 3 minutes	6 rounds/min for 3 minutes
sustained	3 rounds/min indefinitely	3 rounds/min indefinitely
Overall length—firing (0° elevation)	7 m	23 ft
Overall length—travelling (folded position)	4·87 m	16 ft 0 in
Overall length—travelling (with gun forward)	6·63 m	20 ft 9 in
Overall height—travelling (folded position)	1·37 m	4 ft 6 in
Overall height—travelling (with gun forward)	2·63 m	8 ft 8 in
Overall width	1·78 m	5 ft 10 in
Track width	1·40 m	4 ft 7 in
Elevation—maximum	1244 mils	70°
Elevation—minimum	−100 mils	−5·5°
On carriage traverse (fine)	±100 mils	±5·5°
Coarse traverse on platform	6400 mils	360°
Recoil length—at 0° elevation	1·14 m	45 in
Recoil length—at 70° elevation	0·36 m	14 in
Loading angle	All elevations	All elevations
Tyres	9·00 × 16–6 ply	9·00 × 16–6 ply
Downward load on towing eye	168 kg	370 lb

Ammunition—UK Abbot Mk 2 complete system up to Supercharge; or US M1 system (max range 11·4 km) using special ordnance.

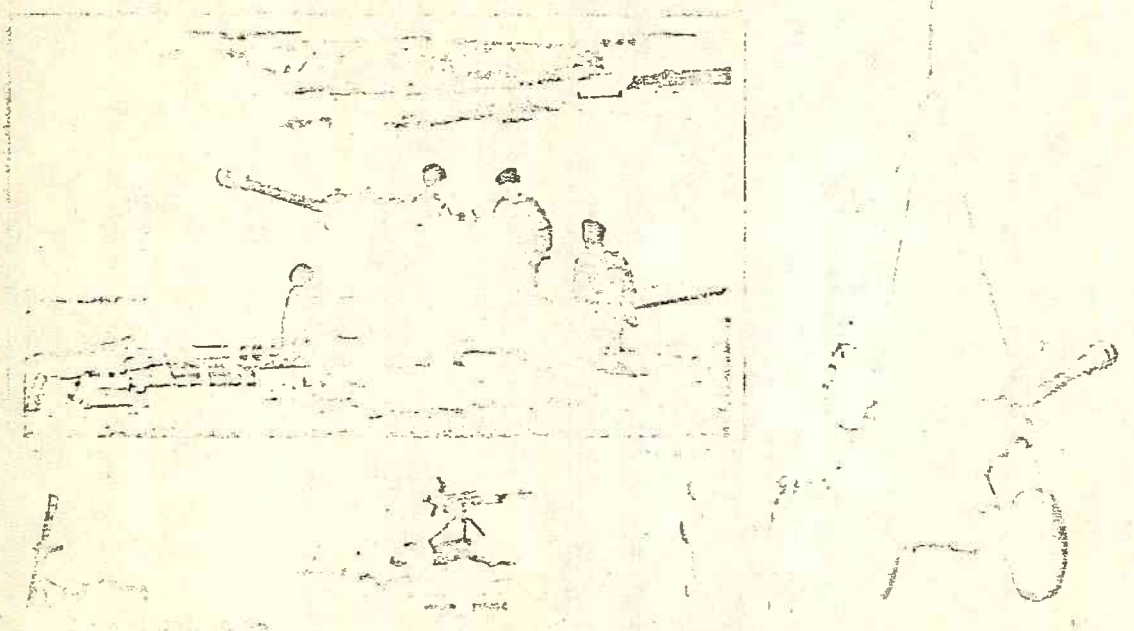
Below: This is the normal folded towing attitude, making a short robust equipment for towing cross-country and a compact size for air transport. It is achieved by jacking up the equipment (jack stowed on the trail), removing the quick-release wheel and traverse gear pin, swinging the gun through 180 deg. clamping the barrel to the trail and finally replacing the wheel. The conversion takes less than one minute



Light Gun de 105 mm

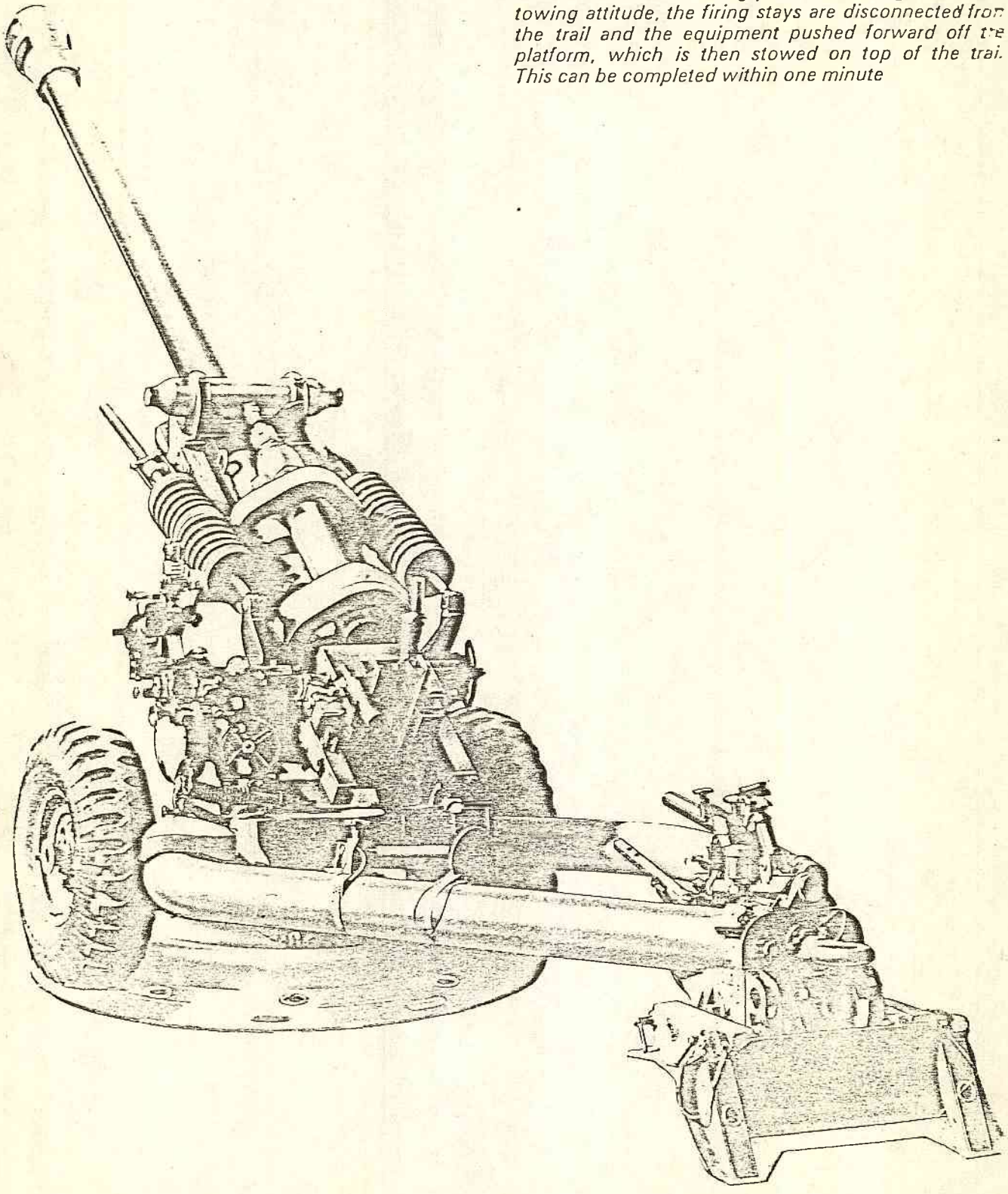


El modernísimo Light Gun de 105 mm británico, que pesa tan sólo 1,858 kg y tiene un alcance de 17 km, es el mejor sistema de cañón de mediano calibre, aeroportado o remolcado, del mundo



Royal Ordnance Factories

To convert from the firing position to the gun-forward towing attitude, the firing stays are disconnected from the trail and the equipment pushed forward off the platform, which is then stowed on top of the trail. This can be completed within one minute



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Telephone: 01-632 3333

1976
1978

mm LIGHT GUN

he 105mm Light Gun is a close support weapon ch has been designed to provide the range, bility, and firepower required in limited war con- ons from the Arctic to the tropics.

he gun fires a 15kg shell with a range of 17,000m. Its wheels it can be towed at a high speed, yet be action within 1min of arriving at the gun position. e elevating mass can be removed to give two light icopter loads, and the gun reassembled with sim- ple tools in less than 30min.

Its low silhouette and fast all round traverse give it an effective anti-tank performance using a HESH shell. Also, the gun can be linked to the FACE fire control system (2415.153).

The gun is fitted with an efficient muzzle brake which does not cause crew discomfort and for cleaning purposes is readily removable. The barrel is of totally new design, being of thin-walled auto-frettaged construction in high yield steel. Barrel wear is negligible so that muzzle velocity should vary very little during the life of the gun.

A vertical sliding block, hand operated breech mechanism of advanced design is actuated by a lever mounted at the top, affording smooth breech opening at all elevations and permitting easy removal of the breech block for cleaning.

The hydropneumatic recoil system has a separate recuperator and the buffer is fitted with cut-off gear to reduce the recoil length from 45in to 20in at full elevation.

A recoil pit is not necessary.

The recoil system is mounted in a lightweight fabricated cradle, which carries the elevating arc and a simple helical compression spring balancing gear.

The saddle is a light fabrication, on which the elevating mass is carried. It provides a top traverse of 100mils left and right.

The direct and indirect sighting system and controls are operated by the layer whilst seated and all controls including the firing lever are immediately accessible to him from this position.

A direct fire telescopic sight, incorporating a moving illuminated graticule which is adjustable in both the X and Y axes to allow for target movement and rang fitted.

Tw knobs on the sight carrier set the angle of sight and tangent elevation for indirect fire and their values appear in two windows. The gun is then elevated until two pointers are matched in a third window.

This advanced sighting system is provided with Trilux nuclear light sources, illuminating all scales and graticules, therefore eliminating the use of any batteries on the equipment.

The trail is fabricated in high strength stainless steel and is bow shaped to enable the breech operator and loader to remain within the trail and maintain a high rate of fire at all elevations. The shape also allows the platform to be conveniently stowed within the trail during travelling.

The platform is a circular lightweight fabrication with a toothed rim which gives a firm base and permanent gun stability even under the most adverse ground conditions.

The tyres run on the outer edge of the platform which is connected to the underside of the gun by two links. This arrangement ensures stability when firing and ease of traverse. The links are also used as front gun stays when the equipment is in the forward area to attitude.

105mm Light Guns (Ministry of Defence)

AMMUNITION:

Charge System.

The charge system is developed to give very long barrel life together with good accuracy. It consists of a five charge cartridge with range overlaps from the minimum range of 2,500m to a maximum of 17,000m.

HE Shell:

The standard HE shell is of forged steel, but to meet the requirements for increased lethality against troops in the open a shell with a body of spheroidal graphite cast iron is under development.

US 105mm Ammunition:

US 105mm ammunition, including the pre-Second World War Mk 1 ammunition can be fired by using a completely interchangeable percussion fired ordnance.

CHARACTERISTICS.

Calibre: 105mm
Weight: 1,818kg
Length firing: 7.01m
Width travelling: 1.778m
Height travelling: 2.133m
Range: 17,000m (maximum with super charge)
Rate of fire: Six rounds/min
Elevation: −5½° to +70°
Traverse: 5½° left and right
360° on turntable
Ammunition: HE, Base ejection smoke, HESH, HESH practice, Illuminating, Target marking, and Canister (under development)
Crew: Six

STATUS.

In production, the first gun was handed over in October 1974, and the weapon entered service with the Royal Artillery early in 1975. It is also in service with a number of countries in the Middle East.

MANUFACTURER.

Royal Ordnance Factory, Nottingham, Nottinghamshire, England

Spend 20

Multi-purpose combat gun

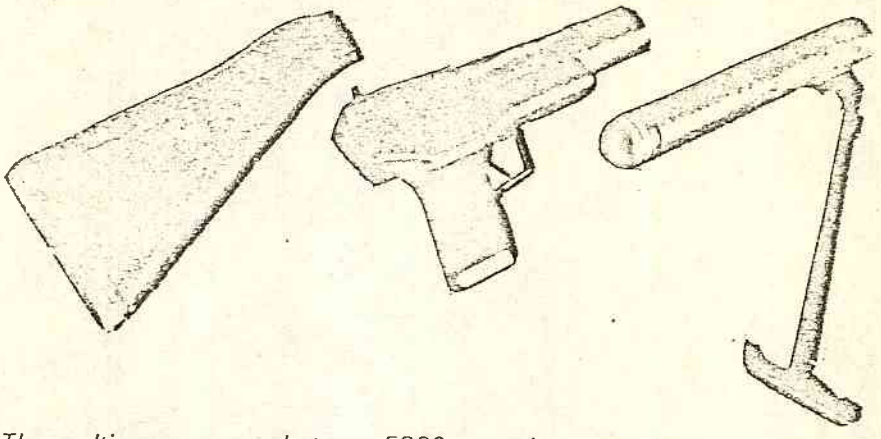
for battlefield and urban conflict

The LBA multi-purpose combat gun FS80 comprises three parts: the pistol unit, the screw-on barrel with monopod and the butt with two attachment points.

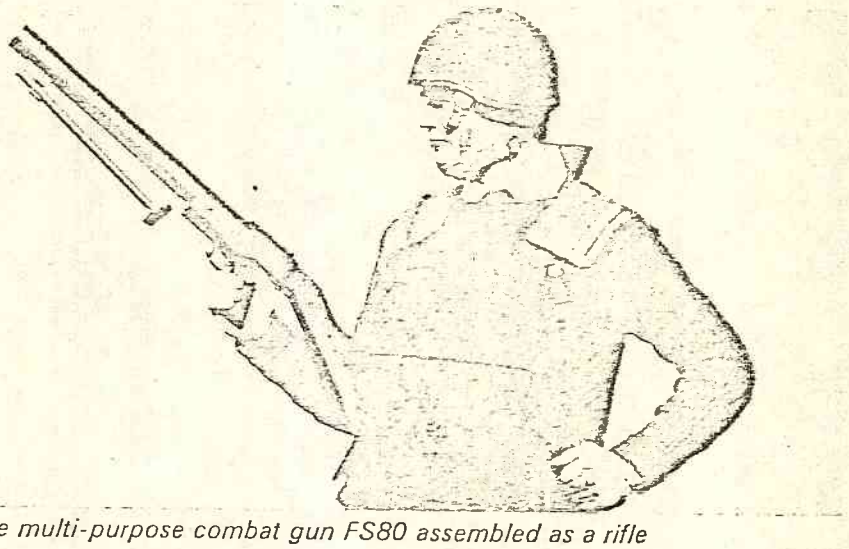
The gun can be used with all existing 38 mm and 12-gauge stores (some with a suitable breech sleeve). The pistol unit by itself is suitable for firing signal, emergency and illuminating flares, smoke, CS, baton rounds and practice stores. With the barrel screwed on and the butt snapped on in-line, the weapon is used as a shoulder gun, the monopod providing an ideal fore grip. With the butt mounted across the rear of the pistol and the monopod extended, the assembly becomes a mortar of outstanding performance.

The combined pistol and barrel unit can also be attached beneath some infantry rifles to create a formidable weapon system. It permits a single infantryman to fire flares or shells and to follow these immediately with standard rifle ammunition. The difficulty of designating targets in close-quarter-combat is thus eliminated.

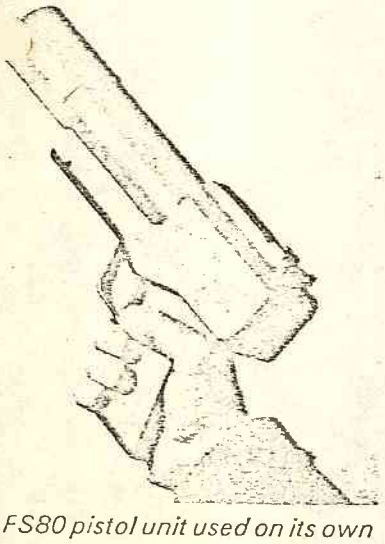
When dismantled, the combat gun and an adequate amount of ammunition can be carried unobtrusively in a small fitted case no larger than a briefcase. The pistol unit weighs 1·6 kg, the barrel unit 0·9 kg and the butt 0·7 kg.



The multi-purpose combat gun FS80, complete assembly



The multi-purpose combat gun FS80 assembled as a rifle



The FS80 pistol unit used on its own

The multi-purpose combat gun FS80 assembled as a mortar

LIGHTWEIGHT BODY ARMOUR LIMITED
Hinton House, Daventry, Northants,
Great Britain, NN11 6OG
Telephone: Ryfield (0327) 61282 Telex: 312112

TRADUCCION - Apendice

Arma de combate multi propósito.

Esta arma comprende tres partes: la pistola, caño atornillado con monopodio y la culata con dos puntos de unión. El arma puede ser usada con cartuchos de 38 mm. y 12. La unidad de pistola por sí misma es adecuada para señales de fuego, emergencia y destellos luminosos, humo. Con el caño tornillado y la culata apretada en una línea, el arma se usa como arma de hombro, el monopodio proporciona un empuñamiento delantero ideal.

Con la culata montada a través de la parte trasera de la pistola y el monopodio extendido, el conjunto se transforma en un mortero de gran performance.

La pistola combinada y la unidad del caño se pueden adjuntar también debajo de algunos rifles de infanteria para crear un formidable sistema de armas. Permite a un simple infante disparar destellos y seguir inmediatamente disparando con municiones standard de refles. Se elimina así la dificultad de blancos designados en combate.

Ground surveillance radar

ZB 298 battlefield surveillance radar

Apêndice 21

The ZB 298 medium-range ground surveillance radar was originally designed to meet a British General Staff requirement for a radar with a maximum range performance of 6 km (3·75 miles). This version is now in service with the British Army as the Radar GS No 14 Mk 1.

The requirement of other nations for a radar with a greater maximum range performance led to the British Army version of the radar being developed to provide a maximum range of 10 km (6·22 miles). This version has been sold in quantity to a number of NATO and other armies.

Within the last few years, a requirement has become apparent for an even greater maximum range, for use in theatres of operation where a line-of-sight range of 20 km or more can normally be achieved. This requirement led to further development of the ZB 298 radar to provide a maximum detection range against moving trucks and tanks of 20 km (12·43 miles).

This improvement was achieved by redesign of the receiver circuits to improve the signal-to-noise ratio, not by any increase in transmitter power; the total power consumption of the radar has not been increased. At the same time as this further development to provide a 20 km range performance, the opportunity was taken to modernise much of the electronics by the use of up-to-date integrated circuitry. Thus, the ZB 298 ground surveillance radar can now be provided with either a 10 or a 20 km maximum range performance, both versions using modern integrated circuits.

After only a few days' training, using a radar simulator specifically designed to provide indoor training facilities, operators can speedily detect, recognise and provide accurate positional information (azimuth, range and angle of sight) and direction of movement on all forms of moving target on land and over water from 50 to 10 000 or 20 000 m range. Helicopters can also be detected. Furthermore, ZB 298 can be used to observe and correct the fire of both artillery and mortars against moving targets which have been previously acquired by the radar.

In both versions, ZB 298 is a non-coherent pulse doppler radar operating in X-band from a 24 V dc supply. Except for a long-life magnetron of proven high reliability, solid-state technology is employed throughout. The complete system consists of a radar head, tripod, remote display unit and battery power supply. When man-packed, the display unit clips to the base of the radar head to form a one-man load. The collapsible tripod and the battery, together with the cables, are carried in an accessory bag to form a second load. The radar is inherently rugged, and requires no special protection for transit.

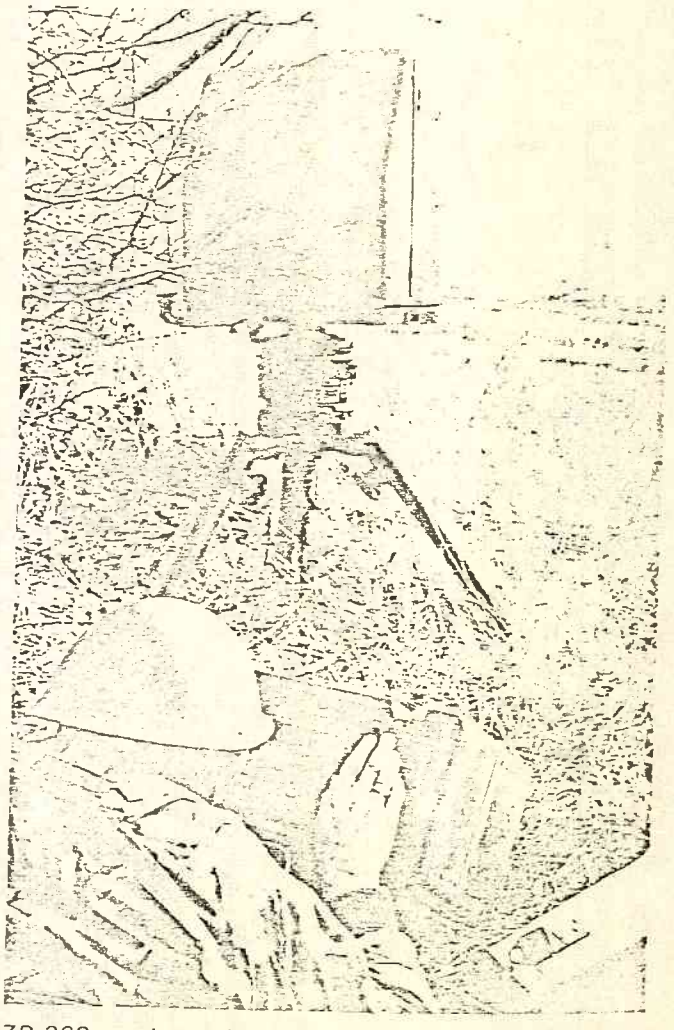
The equipment can be brought into action in 2 to 3 minutes, and because a magnetron with short warm-up time is used, the radar is operational within seconds of switching on. All operations of the radar are performed at the display unit which can be positioned up to 20 m from the radar head.

The display unit incorporates a unique solid-state visual display which allows moving targets to be acquired and tracked, even in the presence of clutter such as vegetation moving in a high wind. An audio output permits recognition of the moving target from the characteristic sounds. Azimuth and elevation read-outs and the telescope graticules are illuminated with Betalights to facilitate use at night.

The radar is designed to be carried by two men, but it can also be mounted on almost any wheeled or tracked vehicle and, if necessary, can be operated from within a closed-down armoured vehicle. A vehicle power supply adaptor is available which provides a switched power supply to the radar and enables spare batteries to be charged by the vehicle.

As part of the system, test gear has been developed which permits general radar technicians to carry out rapid fault finding, repair and testing.

Additional features which are also provided include a confidence check facility to give an operator an instant assurance that the radar is operating correctly, a 1000 m audio alarm to warn the operator of any moving target in the 1000 m range zone, a search arc indicator so that the operator can see at any time the position of the radar head in a preset azimuth sector, and a number of indicator lamps to warn the operator of various possible malfunctions.



ZB 298 can be easily concealed in action as the height of the tripod is adjustable to provide a low silhouette. The remote display unit allows the operator to site himself behind cover

TRADUCCION - APENDICE

Radar de vigilancia en tierra - ZB 298

Este radar de alcance medio se diseño originalmente para un máximo alcance de 6 Km. (3.75 millas).

En los últimos años, hubo un requerimiento para un alcance mayor, para usar en los teatros de operación donde se podrá lográr un alcance de línea de mira de 20 Km. o más. Este requerimiento llevó a producciones posteriores del radar ZB298 para proporcionar un alcance máximo de detección contra objetos que se mueven y tanques a 20 Km. (12.43 millas).

El ZB298 puede ser proporcionado ahora con perfomance de alcance máximo de 10 a 20 Km., ambas versiones usando circuitos modernos integrados.

Despues de unos pocos días de entrenamiento, usando un simulador de radar específicamente diseñado para proporcionar facilidades de entrenamientos, los operadores pueden detectar rápidamente, reconocer y dar una información de posición exacta y dirección del movimiento en todas las formas de movimiento del blanco en tierra y en agua desde 50 a 10.000 ó 20.000 m. del alcance.

Los helicopteros tambien pueden ser detectados. También para observar y corregir el fuego de la artillería y morteros contra blancos movibles.

En ambas versiones el ZB298 es un radar de pulso no-coherente que opera en banda x de 24V dc.

El sistema completo consta de una cabeza de radar, trípode, unidad de display automático y abastecedora de potencia de batería.

El equipo puede entrar en acción en 2 ó 3 minutos.
Todas las operaciones del radar se desarrollan en el display, el cual puede ser puesto a más de 20 m de la cabeza de radar.

La unidad display incorpora un único display visual de estado sólido la cual permite a los blancos movibles ser detectados aún en casos confusos tales como vegetación que se mueve en fuertes vientos. Una salida de audio permite el reconocimiento del blanco móvil mediante sus sonidos característicos. El azimut y lecturas de elevación son iluminadas con Betalights para facilitar el uso de noche.

Se lleva entre dos hombres, pero puede ser montado en casi cualquier vehículo y si es necesario, puede ser operado desde

///.-

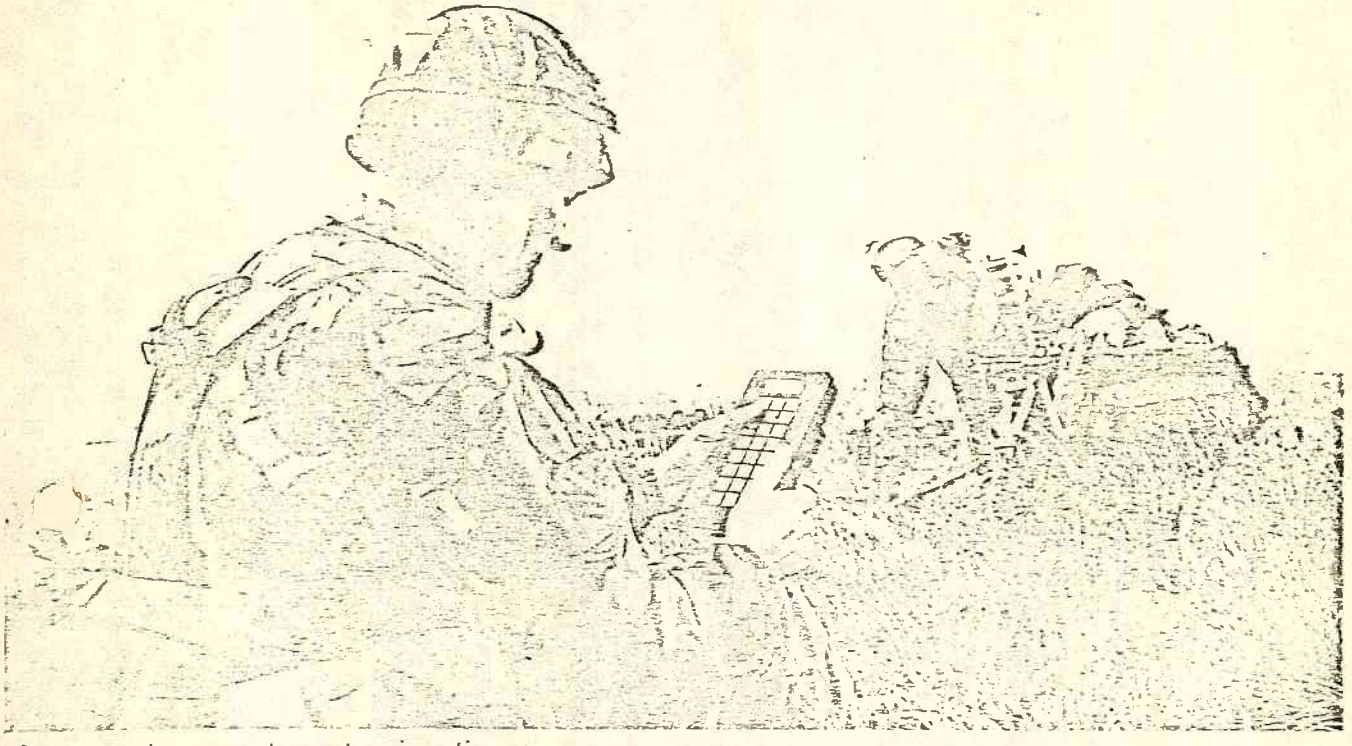
dentro de un vehículo armado y cerrado. Se dispone de un adaptador de abastecimiento de potencia del vehículo, el cual alimenta al radar y permite a las baterías de repuesto ser cargadas por el vehículo.

El chequeo le da al operador una seguridad instantánea de que el radar opera correctamente, una alarma de 1.000 m de audio avisa al operador sobre cualquier blanco móvil hasta un alcance de 1.000 m.

Apêndice 22

Mortar fire data computer

Self-contained hand-held unit



Morcos mortar computer system in action

Morcos is a lightweight hand-held computer for use at mortar locations to produce fast, accurate firing data for mortars. Its operation is simple, and it reduces the strain and possibility of errors in an unfavourable operational environment. Improvements in modern mortars, their ammunition and the means of acquiring mortar targets have meant that the main delays, inaccuracies and errors in the system occur in the method of producing mortar fire data. Morcos eliminates these existing manual methods of fire prediction calculations, which are time-consuming, inaccurate, cl[illegible]y, difficult to teach and wasteful in ammunition.

Morcos is a single self-contained unit incorporating a computer, keyboard for data entry, display and batteries. The case is built of durable plastics and profiled so that it fits comfortably in the hand. It is built to full military specifications to withstand adverse climatic, environmental and nuclear effects.

A wide range of drills is available. For example, programs produced include drills which produce data for high-explosive, smoke and illuminating missions; survey problems; target reduction and three shoots in parallel.

The unit incorporates inputs to take account of variables which effect the accuracy of mortar fire, such as meterological conditions; charge temperature; and difference in altitude between mortar and target. Observers' corrections (including data from laser rangefinders) can easily be applied. It has the capacity to store ten mortar positions, 50 targets, ten observer locations and nine positions of own troops (for warning when own troops are in the danger area).

The computer in Morcos is a microprocessor with access to a semi-conductor backing store. Each ballistic program can predict for one type of mortar and its range of ammunition. This program can be changed in seconds by removing a plug-in part and replacing it by another. This can be done, in the field, in all weather conditions because the moisture seal in the equipment is not broken.

The keyboard is waterproof and reliable. There is an electroluminescent panel under the keyboard which can be illuminated by a pushbutton for night operation. It has 24 keys, ten of which are for digits 0–9. The display has eight alpha-numeric characters and uses high-efficiency, extra bright light-emitting diodes, which have a variable brightness control.

Morcos is powered by batteries, which can be either throwaway or rechargeable, or from an external power source. It weighs, including batteries, less than 1·35 kg (3 lb) and measures 230 mm (9 in) long, by 101 mm (4·4 in) wide and 54 mm (2 in) deep. It is a highly reliable system since the internal interconnections, via wiring looms, have been kept to a minimum by the use of large-scale integration and hybrid techniques. Faults can be quickly repaired by easily replaceable sub-assemblies, and no special first line test equipment is needed.

A GEC-Marconi Electronics Company
MARCONI SPACE AND DEFENCE SYSTEMS LIMITED
Sales Department
The Grove, Warren Lane Stanmore, Middlesex, Great Britain, HA7 4LY
Telephone: 01 954 2311 [illegible]

MSDS

TRADUCCION - Apendice

Computadora de datos de mortero.

Morcos es una computadora liviana que se usa en posiciones de morteros para producir datos rápidos y certeros del fuego para morteros. Su operación es simple y reduce el esfuerzo y la posibilidad de errores en un medio ambiente de operación desfavorable. Morcos elimina los métodos manuales existentes de cálculos de predicción de fuego, que consumen tiempo, inexactitudes y gastos de municiones.

Morcos es una unidad simple que incorpora una computadora tablero de entrada de datos, display y baterías. La caja es de un plástico durable. Se construyó para todas las especificaciones militares. Se dispone de una amplia gama de tarjetas. Por ejemplo los programas hechos incluyen tarjeta que producen datos para altos explosivos, humo y misiones de iluminación, problemas de supervivencia, reducción de blanco, y tres disparos en paralelo.
Su unidad incorpora entradas para tner en cuenta las variables que indican la exactitud del fuego del mortero tales como condiciones meteorológicos, temperatura de carga y diferencia en la altitud entre el mortero y el blanco.
Tiene la capacidad de almacenar 10 posiciones de mortero, 50 blancos, 10 posiciones del observador y 9 posiciones de las propias tropas. (por precaución, cuando las propias tropas están en área de peligro).
La computadora en Morcos es una microprocesadora con acceso a una reserva semi conductora. Cada programa balística puede predecir para un tipo de mortero y su alcance de munición. Este programa puede ser cambiado en segundos sacando un plug y reemplazandolo por otro. Esto puede ser hecho en el campo, en cualquier condición climatica a causa de que el sello de humedad en el equipo no se rompe. El tablero es confiable y a prueba de agua. Hay un panel electroluminiscente bajo el tablero que se ilumina apretando un botón para operación en las noches. Tiene 24 teclas, diez de las cuales son para los dígitos 0 al 9. El display tiene 8 caracteres alfa numéricos.

nd from which it is fired, and an articulated arm made of strong material. The latter contains the trigger, safety and percussion and a periscopic sight the eyepiece of which can be adjusted to he firer to use the periscope either vertically or horizontally in either n. The weapon can then be fired over or round a wall, tree-trunk or bject providing protection for the firer. For storage the sight arm rallel with the container/launch tube and the whole – which con- an expendable one-shot weapon – is enclosed in an hermetically- over.

ocket is fin-stabilised by folding fins which open as it leaves the ming is automatic on firing and takes place about six metres from Although the weapon is intended primarily for use in an anti-armour

DATA
Calibre: 65mm
Dimensions: Folded 340 × 155 × 74mm: Open 340 × 195 × 74mm
Weight: Weapons: 1.85kg stored. 1.395kg ready to fire
Rocket: 0.85kg
Initial velocity: 75 m/s approx
Range: 50m
Penetration: 300mm armour at 70° incidence

Manufacturer: Thomson-Brandt, Branche Hotchkiss-Brandt-Armements, 52 avenue des Champs Elysees, 75008 Paris
Status: Development completed

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and ENTAC ANTI-TANK MISSILES

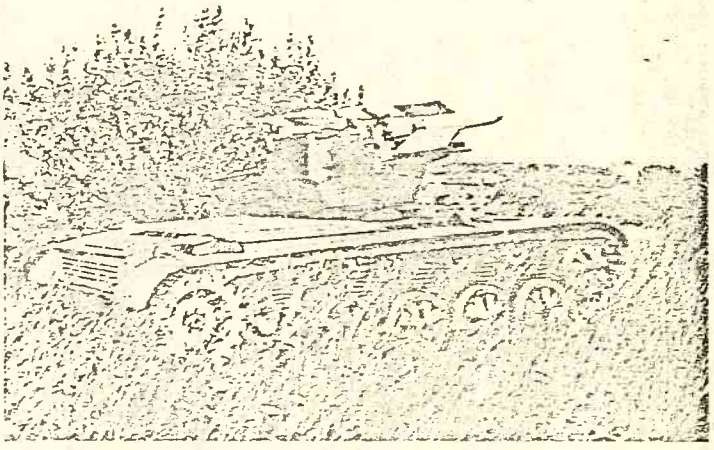
re informed by the manufacturers that both SS10 and ENTAC are olete, are no longer in production and are probably not in service re now. Both have been described in detail in previous editions of *nfantry Weapons.*

ANTI-TANK MISSILE

SS11 is a line-of-sight wire-guided missile launched from either a or a ramp. The operator uses an optical sight and gathers the target he of sight. It is then kept there by means of a joystick control and the n the rear end of the missile help in this task.

62 the SS11 B1 was introduced using transistorised firing equip- This system provides a number of different warheads. There are nour warheads (Type 140AC), anti-personnel (Type 140AP59), the 40APO[illegible]ich penetrates 10mm of plate at 3,000 metres and s 2 met[illegible]behind the plate, and an inert practice head.

SS11 has been extensively installed as a helicopter-borne anti-tank n.



SS11 on a vehicle mounting

Wire guided infantry anti-tank system
ice principle: Command to line of sight (MCLOS)
ice method: Optical sight, wire link control varying thrust of sus-

sion: Two stage solid propellant motor
length: 1.210mm
diameter: 164mm
pan: 500mm
n weight: 29.9kg
speed: 155 m/s (average)

Minimum: 350m
Max.: 3,000m
ation (Type 140AC): more than 550mm

Manufacturer: Société Nationale Industrielle Aérospatiale, Division des Engins Tactiques, 2-18 rue Béranger, 92320 Chatillon-sous-Bagneux
Status: Current. In production. 170,000 produced by June 1979
Service: Belgium, Canada, France, West Germany, India, Iran, Israel, Italy, the Netherlands, the UK and the USA. Used also by 17 other countries. Manufactured under licence in India and West Germany

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N PORTABLE ANTI-TANK WEAPON

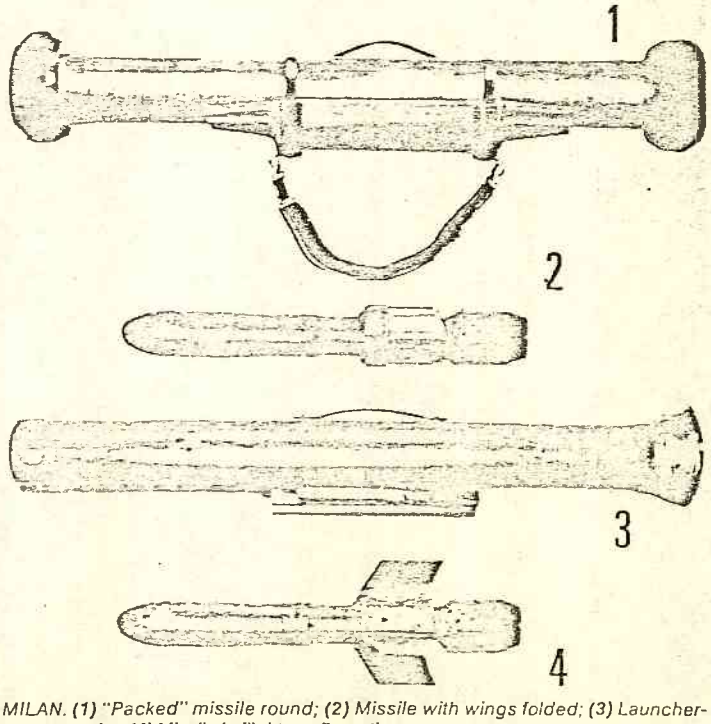
N is a weapon which has been introduced by an international ium of [illegible]French Aérospatiale Group and the West German MBB The ori[illegible]al design originated in France, which explains its pres- the French section, but it is now a truly international weapon and is nultaneously by both concerns and under licence in the United m.

Missile d'Infanterie Léger Anti-char (MILAN) is designed to be used ntry from a defensive position and the emphasis is placed on this use than on vehicle mounting. MILAN is a SACLOS wire-controlled and the task of the operator is to keep his cross hairs on the target. re on the missile emits an infra red signature which enables the er to measure the error between its position and the line of sight. locity is twice that of most early portable missiles and allows the missile to reach 1,500 metres in 10 seconds and 2 kilometres in 13 s.

complete weapon system is made up of two units as follows:
ound of ammunition, consisting of a missile, factory loaded into a launcher/container tube.
combined launching and guidance unit, consisting of a launcher ed with a periscopic optical sight and an infra red tracking and ce system, the whole being mounted on a tripod.

round of ammunition comprises an assembled missile, factory with wings folded into a sealed tube which serves the dual purpose ge/transport container and launching tube.

container/launcher tube is fitted with mechanical and electrical onnection fittings and a self-activating battery is mounted on the to provide electrical power for the firing installation.



MILAN. (1) "Packed" missile round; (2) Missile with wings folded; (3) Launcher-transport tube; (4) Missile in flight configuration

MISSILE

The missile is an assembly of the following main components:

(a) an ogival head containing a shaped charge and fuze.

(b) a two-stage solid propellant motor discharging through an exhaust tube to a central nozzle located at the rear of the missile.

(c) a rear part containing the jet spoiler control system and guidance components. The guidance components include:

(1) a gas driven, turbine operated gyro

(2) an infra red flare

(3) a spool carrying the two guidance wires in one cable

(4) a decoder unit

(5) a self-activating battery for internal power supply

The missile is launched from its tube by a booster charge gas generator which is contained in the tube and burns for 45 milliseconds. Initial velocity is 75 metres/second.

The recoil effect is compensated but a part of it is used to eject the tube to the rear of the gunner to a distance of approximately 2 metres.

The two-stage propulsion motor burns for 13.0 seconds and increases the velocity of the missile, at first rapidly, then more slowly to 200 metres/second. The operator must keep his sight cross-hairs on the target throughout the engagement.

Guidance is achieved by means of a single jet spoiler operating in the sustainer motor exhaust jet. The jet spoiler operates on guidance command signals generated automatically by the launcher/sight unit (by measurement of the angular departure of the missile from the reference directions of the infra red tracker in the right unit) and transmitted to the missile via the guidance wires which unwind from the missile. In this respect Milan resembles HOT.

The guidance commands are decoded by a transistorised decoder unit within the missile. The self-activating battery which provides internal power is designed for long-term storage and use in world-wide temperature conditions.

The versatility of this missile is being further enhanced by a thermal-imaging sight. This sight mounts on top of the guidance post and allows firing to the full range of the missile in poor visibility or at night.

SAFETY ARRANGEMENTS

The missile is locked inside its tube and the solid propellant gas generator cannot be ignited until the missile is unlocked by the gunner.

The sustainer motor ignites when the missile is released from the tube and the wings have unfolded.

The fuze cannot arm until:

(a) the sustainer motor is ignited;

(b) an electrical safety device functions when the missile has flown approximately 20 metres.

DATA

Missile

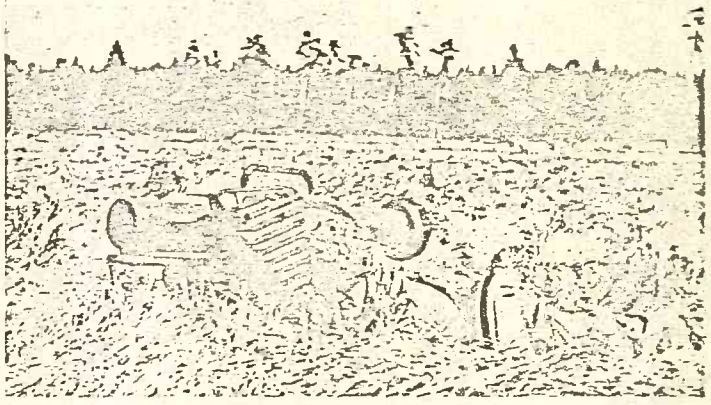
Type: Wire-guided SACLOS system
Weight (ready to fire): 6.65kg
Length: 769mm
Midbody diameter: 90mm
Warhead diameter: 103mm
Wingspan (wings unfolded): 265mm
Warhead, with fuze, weight: 2.98kg
Warhead filling: 1.45kg
Cone diameter: 103mm
Fuze: 0.3kg

Ammunition (Tactical package)

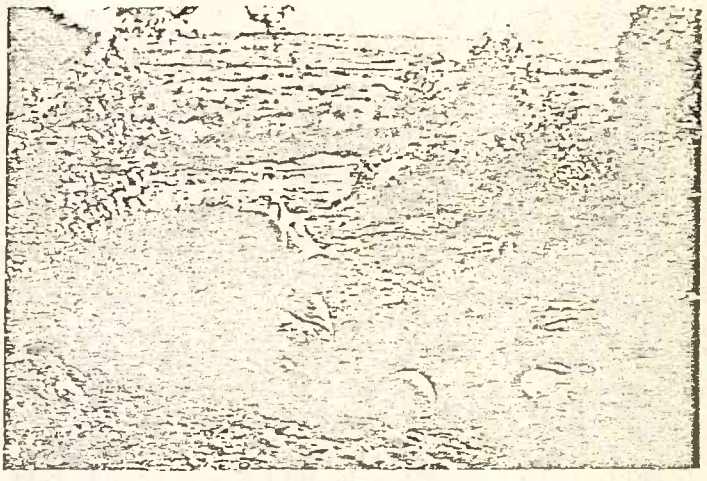
Weight in carrying condition: 11.8kg
Weight, ready to fire: 11.3kg
Length: 1,260mm
Body diameter: 133mm
Diameter at rear across flare cone: 182mm

Launching/Guidance Unit (folded)

Weight: 16.4kg
Length: 900mm
Height: 650mm



MILAN in use by West German Army



MILAN tactically sited

Width: 420mm
Traverse: 360°
Elevation: up to 20°

PERFORMANCE

Velocity

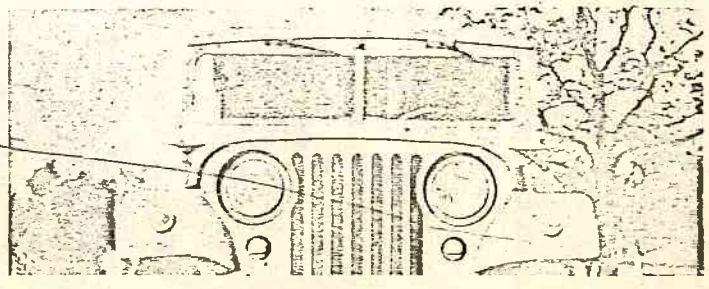
At launch: 75 m/s
At 2km: 200 m/s
Time of flight to max. range: 13s
Effective range: 25-2,000m
Chance of a hit 0-250m: 75% (average)
250-2,000m: Greater than 98% (Makers' figures)
Warhead: Shaped charge. Detonated by electrical connection produced by crush-up of ogive when missile hits. Minimum performance is the triple penetration of NATO heavy tank plate

Manufacturers: Aérospatiale, 2-18 rue Béranger, 92320 Chatillon-sous-Bagneux, France; Messerschmitt-Bölkow-Blohm, 8012 Ottobrunn bei München, Federal Republic of Germany; Marketed by Euromissile, 37 boulevard de Montmorency, 75016 Paris. Licensed manufacture in UK by British Aerospace, Stevenage, Hertfordshire
Status: Current. In production
Service: In service in France, West Germany and UK. Also being supplied to other NATO and non-NATO countries

1160 SAMO WEAPON SYSTEM

The SAMO mount is intended to be used on the Land Rover type of vehicle. It can also be mounted on an armoured vehicle. The SAMO mount has two arms, each of which has four missiles. Normally the arms and the missiles they carry will be carried inside the hood of the vehicle but they take only four seconds to be extended using the power of a 24 volt battery.

The missiles carried can be ENTAC or SS11. Binoculars linked to the firing mount control the initial elevation of the missile. The vehicle is aligned so that it points either at the target or into the centre of an arc it is covering. It is not possible to fire the missile if the arms of the mount are not fully extended.



Apendice 24

UNITED KINGDOM

2409.131

BLOWPIPE PORTABLE ANTI-AIRCRAFT MISSILE SYSTEM

Blowpipe is a surface-to-air weapon for unit self defence in forward areas against close-range low-level air attack. To carry out this role effectively the equipment is compact, light, and simple so that it can be both carried and operated by one man.

The weapon is suitable for use in extremes of climate with no maintenance needed during long periods in the field. It can be brought into action very rapidly, and reloading time is a few seconds. Blowpipe can be used against both attacking and receding fast aircraft and helicopter targets.

The Blowpipe weapon system is entirely self-contained with no external power requirements, and consists of two main components: the missile, sealed within its launching canister, and the aiming unit. The missile/canister combination is treated as a round of ammunition that can be taken out of store and fired with no preparation or testing. The aiming unit houses all the necessary equipment and controls to launch the missile and guide it towards the target.

CHARACTERISTICS:

Type: Man-portable, shoulder-fired surface-to-air (or surface) tactical guided missile

Guidance and IFF principle: Radio command with optical tracking

Guidance method: Twist and steer by nose-mounted control surfaces

Propulsion: Two-stage booster-accelerator solid-propellant rocket motor

Warhead: High-explosive with proximity fuze

Missile length: 1.4m

Missile diameter: 76mm

System weight: 21.90kg (with IFF)
20.67kg (with system switch)

OPERATION:

To prepare the system for action all that is necessary is to clip the aiming unit to the canister, which requires only a few seconds, and the complete system, which weighs less than 22kg, is lifted to the man's shoulder. The aimer acquires his target in his monocular sight, fires the missile, and controls its flight to the target by means of a thumb-operated flight controller.

The act of pulling the trigger activates thermal batteries for power supplies in both the missile and canister (to supply the aiming unit). When these batteries have reached a sufficiently high voltage (in about 1 second), the missile first stage motor ejects the missile from the canister. This motor is extinguished before the missile fully emerges and the missile coasts for a safe distance from the aimer before the second stage main motor ignites to boost the missile to supersonic speed.

The missile is fitted with flares which in the early stages of flight are detected by a sensor in the Aiming Unit to gather the missile to the centre of the aimer's field of view. From then on the aimer guides the missile to the target by means of the controller with up/down and left/right movements. When within lethal distance of the target a proximity fuze in the nose of the missile detonates the warhead.

Commands are transmitted to the missile over a radio link, through the receiver and decoder to the missile control system. This works on 'twist and steer' principles with one pair of nose-mounted control surfaces working differentially to produce roll, and the other pair producing lateral movements.

To meet the requirements of an IFF policy, a fully integrated IFF system is available for use with Blowpipe and is physically attached to the aiming unit. This facility prevents the inadvertent engagement of friendly aircraft which may have been incorrectly identified visually and considerably reduces reaction times.

The missile has a slim, cylindrical body and ogival-nose cone. Cruciform delta-shape canard control surfaces are mounted on the nose cone and a unique type of cruciform delta-shape tail-fin assembly is used. This consists of a sliding ring structure which, in the launching canister, is positioned near the nose of the missile, enabling the diameter of the rear of the canister to be minimised. As the missile is launched, it passes through the tail-fin assembly which finally locks on the rear of the missile. The folded wing tips open to their full span as they emerge from the canister.

Shorts Blowpipe close-range guided missile deployed. Although designed for low-level air defence, Blowpipe can also be used against lightly armoured surface targets

STATUS:

In service with the British and Canadian Armed Forces.

MANUFACTURERS

The following manufacturers are known to have been associated with the development and manufacture of the system.

Main contractor: Short Brothers Limited, Belfast.
IFF System: Cossor Electronics Ltd.
Fuze: Marconi Space and Defence System Ltd.
Ignition, safety, and arming unit: Royal Ordnance Factory, Blackburn.
Firing circuits: Pye Dynamics Ltd.
Thermal batteries: Mine Safety Appliances Ltd.

The co-ordinating research and development authority is the Royal Radar Establishment.

Spudice A25-

Guided missiles and weapon systems

The following are brief details of the Rapier and Swingfire guided missile systems. Details of other guided weapon systems by the British Aerospace Dynamics Group are given on preceding pages.

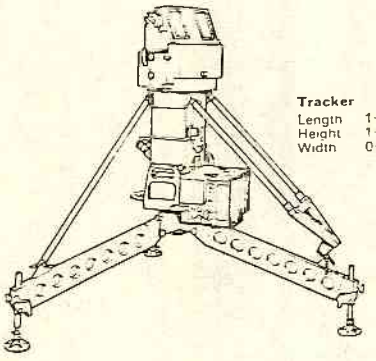
Rapier

Rapier is the most important tactical anti-aircraft guided weapon system in production today. It is a low-cost system specifically designed for defence against low-level attacking supersonic and manoeuvring aircraft. Rapier is the only anti-aircraft missile defence system accepted by NATO. It is in service in the UK and Germany and with the armed forces of five other countries, including Australia. Brunei has recently ordered the system.

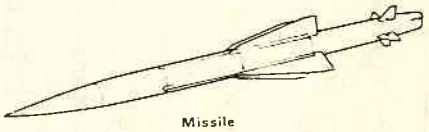
More than 300 systems and 10 000 missiles have been produced. Over 3000 missiles have been fired of which over 2600 have been used for operational practice firings.

Rapier has optical command to line-of-sight guidance, or radar guidance for all-weather operation with the Blindfire radar tracker. The effectiveness of Rapier with Blindfire has been demonstrated; the combined system is now in service with the Royal Air Force Regiment, the British Army and the defence forces of three other countries.

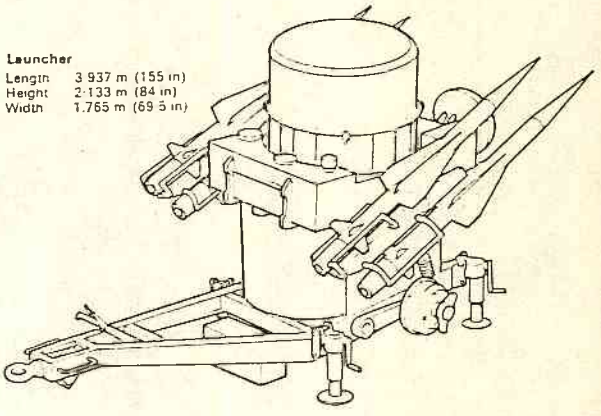
The low weight of Rapier makes it readily transportable by conventional transport, on trailers, half-tracked vehicles or armoured vehicles; it is equally suitable for



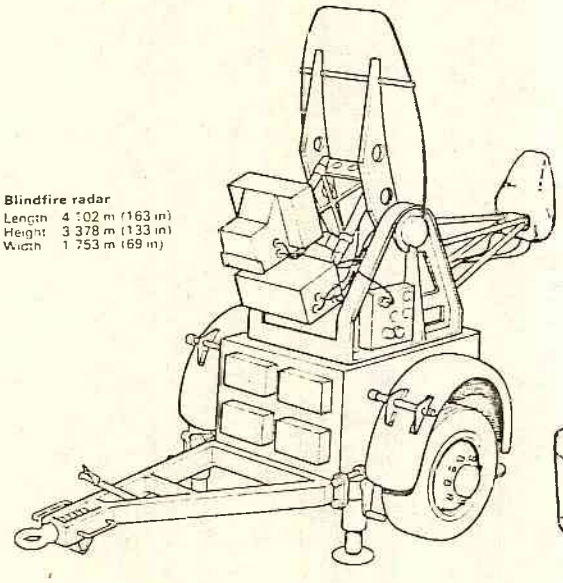
Tracker
Length 1·219 m (48 in)
Height 1·575 m (62 in)
Width 0·609 m (24 in)



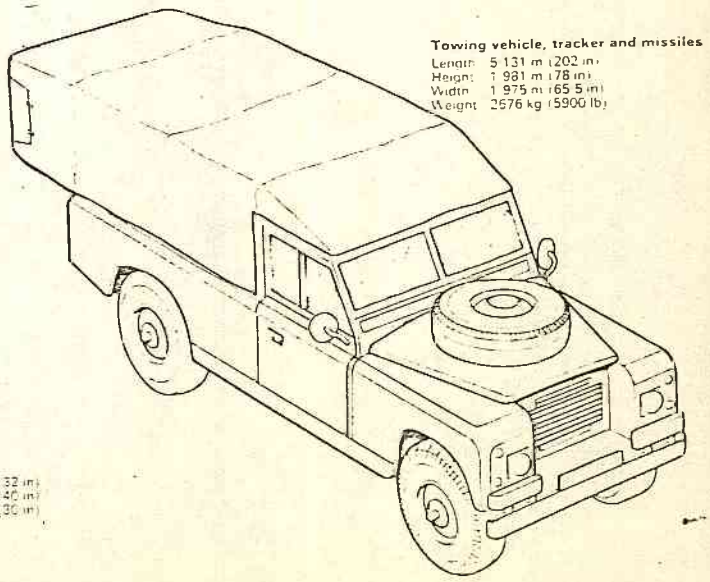
Missile
Span 0·381 m (15 in)
Length 2·235 m (88 in)
Diameter 0·127 m (5 in)



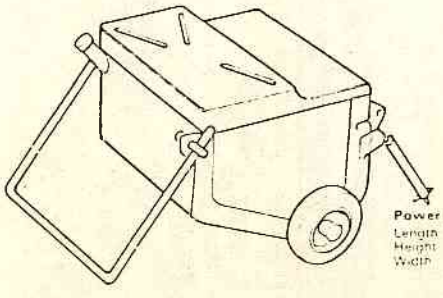
Launcher
Length 3·937 m (155 in)
Height 2·133 m (84 in)
Width 1·765 m (69·5 in)



Blindfire radar
Length 4·102 m (163 in)
Height 3·378 m (133 in)
Width 1·753 m (69 in)



Towing vehicle, tracker and missiles
Length 5·131 m (202 in)
Height 1·981 m (78 in)
Width 1·975 m (65·5 in)
Weight 2676 kg (5900 lb)



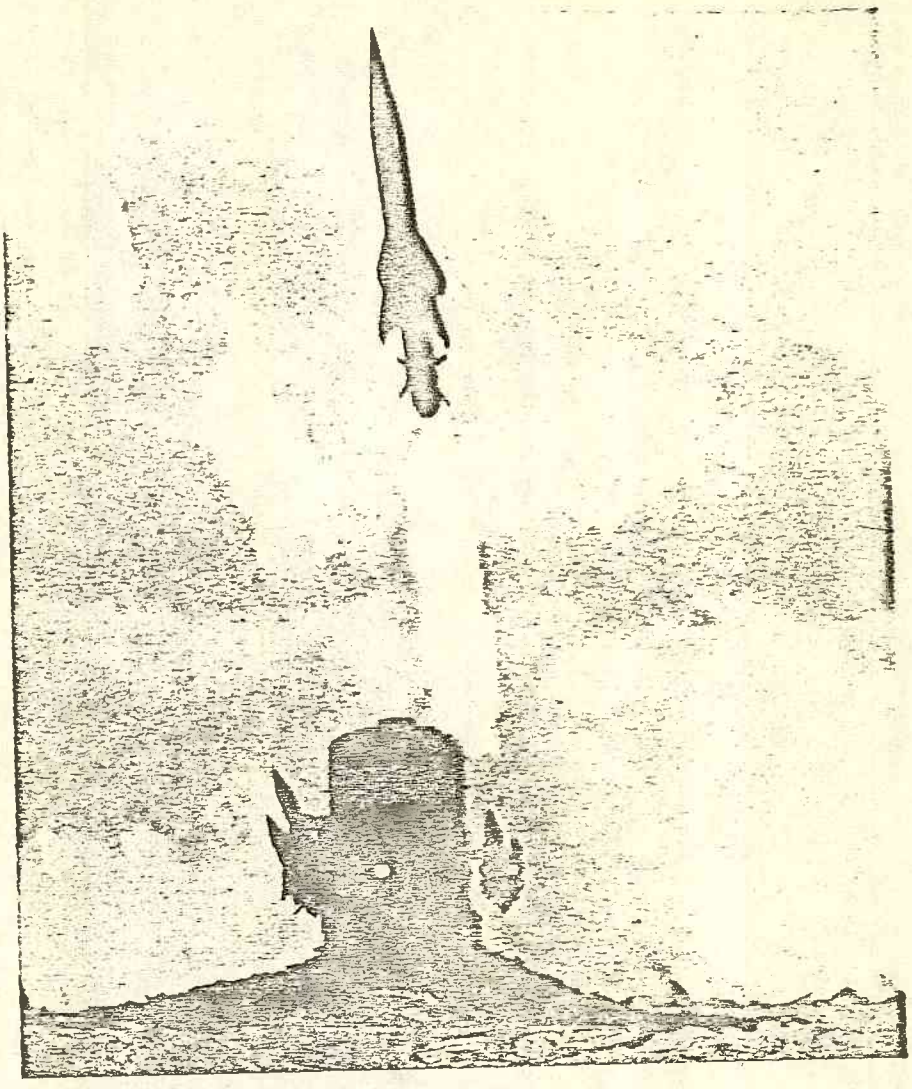
Power unit
Length 0·813 m (32 in)
Height 1·016 m (40 in)
Width 0·762 m (30 in)

transport in aircraft and by helicopter lift. Tracked Rapier is a highly mobile version of the system with all the equipment carried on a purpose-built amphibious tracked vehicle.

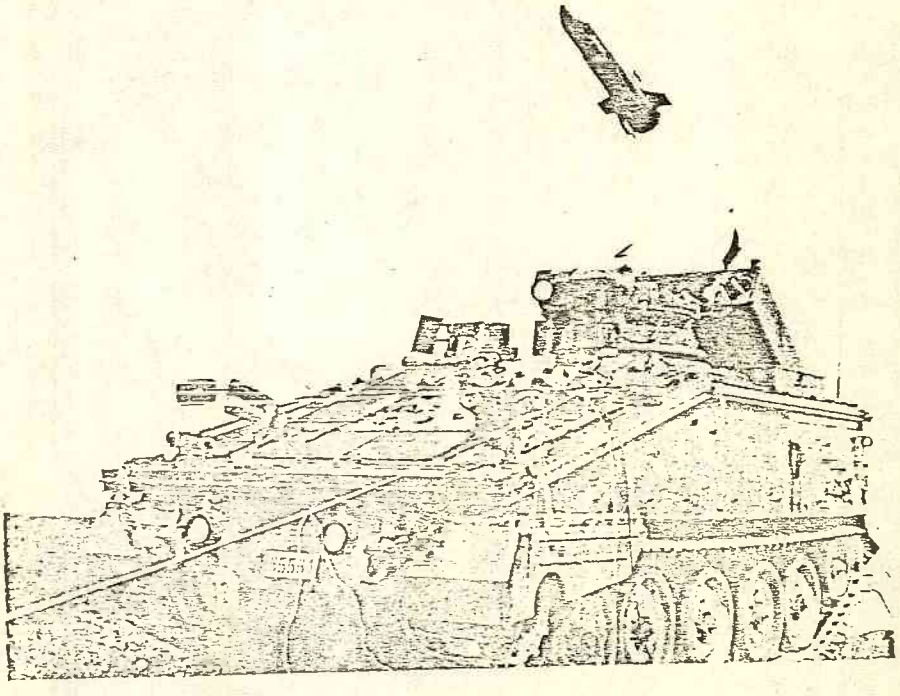
Rapid deployment and extreme simplicity of operation are two of the special features of Rapier which can be operated in action by only one man. For deployment and reloading, a minimum detachment of three men is required, all of whom act as relief operators.

In operation, the highly efficient search radar continuously scans the horizon. Any detected aircraft is automatically interrogated and, if no friendly identification friend-or-foe (IFF) response is received, an alarm is sounded to alert the operator. Simultaneously, the optical head of the tracker and the launcher turntable are aligned with target. The operator acquires and commences to track the target, using a joy-stick control. An in-cover lamp signals when the target can be engaged. The operator then presses the firing button to launch a missile. The operator's only remaining task is to keep tracking the target until missile impact. Command-to-line-of-sight guidance is entirely automatic.

The extremely accurate guidance system, high missile manoeuvrability and a lethal warhead ensure a high kill probability.



Launching Rapier (above) and Swingfire (below)



Swingfire

Swingfire is a long-range ground-to-ground wire-guided anti-tank weapon which can be installed in all types of fighting vehicle. Swingfire is in full production and in service with the British, Belgian and Egyptian armies as well as with other defence forces.

Swingfire can be fired and controlled by an operator some distance away from the launch vehicle. Due to its low launch acceleration and jetavator, it has a good short-range performance, providing exceptionally wide cover. Swingfire has been designed to be as robust as ordinary ammunition and requires no testing in the field.

Swingfire is the main armament of Striker, the guided weapon varient in the new CVR(T) range of vehicles. A dismountable, crew-portable system, known as Infantry Swingfire has also been developed.

BRITISH AEROSPACE DYNAMICS GROUP
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BRITISH AEROSPACE DYNAMICS GROUP

Appendice 20

[illegible] R
[illegible]T)

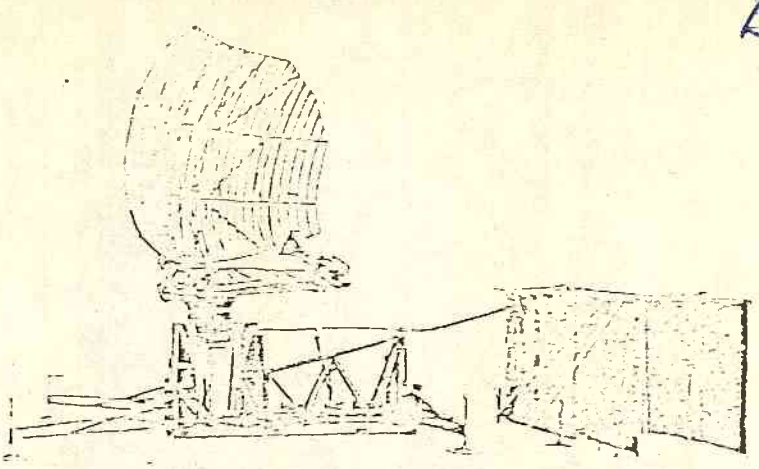
[illegible] 544 is a lightweight [illegible] transportable D-band air surveillance radar. It was [illegible] anywhere in the world as the sensor [illegible] the Forward Air-Control Post of the US 407L [illegible] (TACS).

The equipment comprises a transportable equipment shelter (containing the electronic equipment including IFF) and a palletised antenna. It can be transported by helicopter, aircraft, and all forms of surface transport and it is said that it can be put into operation after transport in less than one hour.

Main features of the equipment are set out in the accompanying table.

DEVELOPMENT:

Prototypes of the equipment were submitted to the USAF and successfully passed all tests. Following this the equipment was put into production, and by February 1976 deliveries were known to include 26 systems to the USAF, and seven modified systems



544 GROUND RADAR/USA

CHARACTERISTICS:

Antenna:

Type:

Search: Modified parabolic

IFF: [illegible]al with search radar feed system and reflector

Aperture, search:

Horizontal: Greater than 45m

Vertical: Greater than 2.7m

Beam width (one-way), search and IFF:

Horizontal: 3.8°

Vertical: 8° with cosecant squaring from 7° to 27°

Polarisation:

Search: Horizontal

IFF: Vertical

Type of feed: Search and IFF: Horn

Beam pattern search and IFF:

Horizontal: Conventional fan beam (cosine between 3dB points), side lobes 25dB down, back lobes 30dB down

Vertical: Conventional fan beam with cosecant squaring

Scan:

Azimuth: 0 to 15rpm, clockwise in automatic, or manually searchlighting, clockwise or counter clockwise

Elevation: Manually adjustable, −3° to +6°

Transmitter:

Power:

Peak: 1MW, or greater

Average: 1.12kW at 800 0.745kW at 533, 1.12kW at 267

Pulse repetition frequency:

Manually selectable: 800, 533, 267

Momentary selectable: ±10microsec stagger on 800PRF

Frequency: 1.25 to 1.35GHz, continuously tunable over full range by local or remote tuning control

Tuning rate: 1MHz per sec

Pulse: Width automatically selected when PRF is selected:

1.4microsec for 800PRF

1.4microsec for 533PRF

4.2microsec for 267PRF

Rise time: 100nanosec, maximum

Receiver:

Noise figure: Typically 3dB, overall

Dynamic range: 65dB

Choice of IF: Logarithmic, linear, or wideband limiting

Signal processing:

MTI:

(a) Digital type

(b) Double (three-pulse) canceller

(c) Cancellation ratio — typical 40dB

(d) Subclutter visibility −30dB searchlighting, 20dB scanning (6rpm)

(e) Staggered PRF eliminates blind speeds

VSI:

(a) Digital type

(b) Feedback factor −0.875

(c) Two-channel: MTI and normal

(d) Railing suppression 12dB minimum

Accuracy:

Range: 0.5nm on 400PRF; 0.1nm on 800 and 533PRF

Azimuth: ±1°

Type of information displays:

(a) PPI

(b) A-scope

(c) Output jacks and cabling provided for remote displays

MANUFACTURER:

Cardion Electronics, Long Island Expressway, Woodbury, New York 11797, USA.

TRADUCCION - APENDICE

Radar de vigilancia táctica (Alerta) AN/TPS 44

El AN/TPS 44 es un radar de vigilancia transportable por aire con banda D, de estado sólido y de poco peso. Se diseñó para ser usado en cualquier parte como sensor para el Puesto de Control Aéreo Adelantado del Sistema 407 L de US (TACS).
El equipo comprende un contenedor transportable (que contiene el equipamiento electrónico incluyendo IFF) y una antena paletizada Puede ser transportado en helicóptero, avión y de cualquier forma de transporte de superficie y se puede poner en operación, después de su transporte, en menos de una hora.
Las características principales del equipo se indican en la tabla de abajo.

Producción:

Los prototipos del equipamiento estaban sometidos a la USAF y pasaron con éxito todas las pruebas. Siguiendo ésto, se puso el equipo en producción, y en Febrero de 1976 se hicieron 26 entregas del Sistema.

Apendice 27

Heavy-duty earthmovers

Loaders, tractors, scrapers and dumptrucks

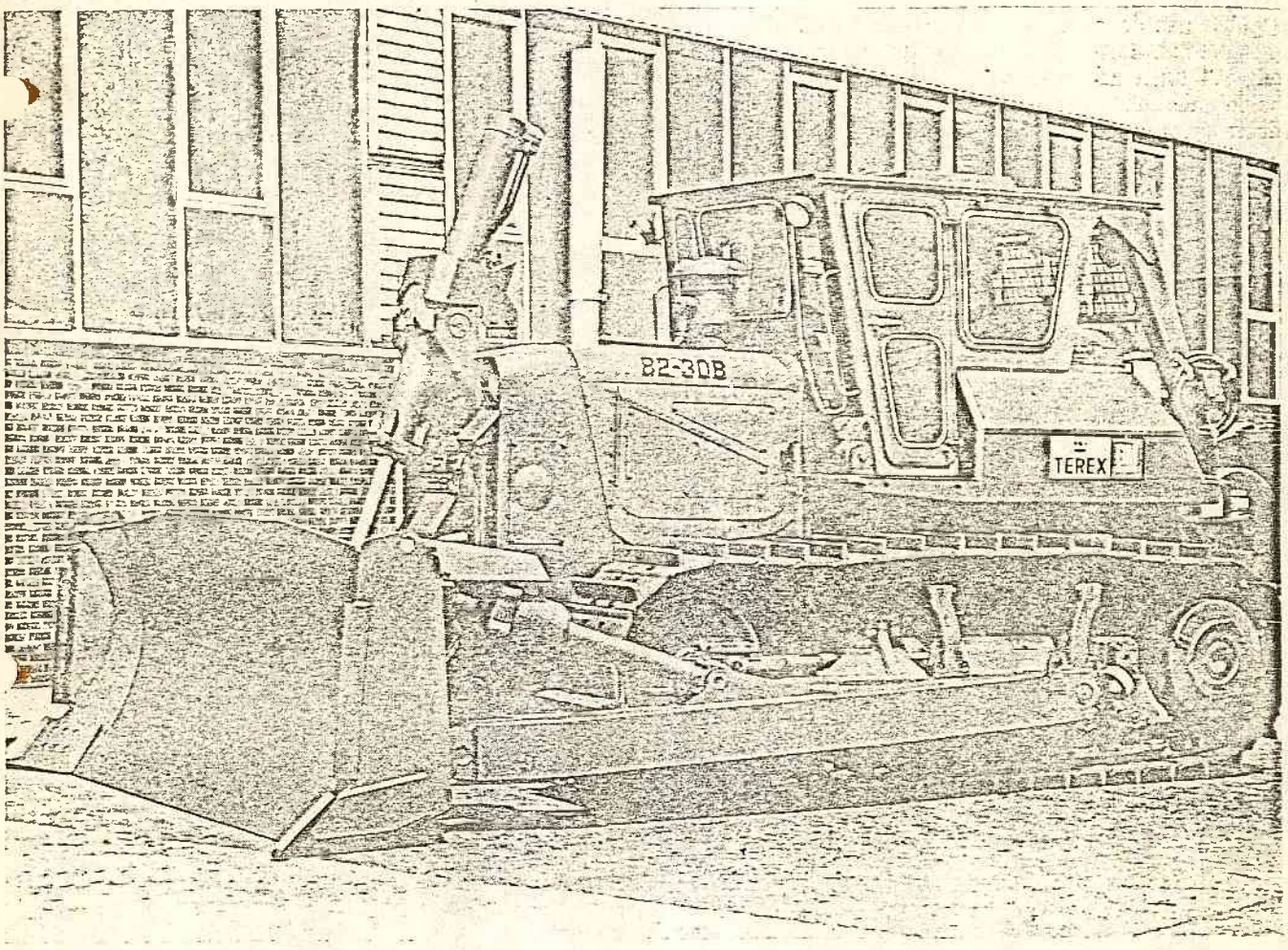
When buying earthmoving plant the military engineer is confronted with a bewildering variety of fully developed and well-proven commercial types from which to pick the right selection of equipment for a range of operational tasks which are largely unpredictable in nature, degree of difficulty and scope but which have to be completed at top speed. His problem is to reconcile the efficiency and guaranteed performance of big, specialised machines with the equally pressing needs for mobility and versatility.

General Motors Scotland Limited has made a study of typical military mobility requirements and specialises in tailoring its Terex earthmoving equipment to the closest possible match with the limitations imposed. It also builds in a high degree of versatility in application without creating an additional problem in the transport of loose attachments.

The four main product groups are wheeled loaders up to 5·0 m³ bucket size, crawler tractors up to 194 kW power rating, motorised scrapers up to 18·4 m³ struck capacity and dumptrucks up to 77 tonnes payload.

Details of four machines which are currently supplied to the British Army are given below as examples of successful developments by the company in the military field.

Full information on all products is available from GMS or from Terex dealers in the countries concerned.



82–30B crawler tractor

A modern powershift machine, rated at 194 kW (260 hp), which entered service with the British Army, in 1979. The emphasis in design is on ease of control, operator comfort and protection. The military version shown is fitted with a full environmental cab, tiltdozer blade and either a logging winch or a parallelogram ripper on the rear end. The cab has a special low-height modification intended for road movement on standard low-loaders under bridges of not less than 4 m clearance height. It incorporates a rollover protection structure and full air-conditioning.

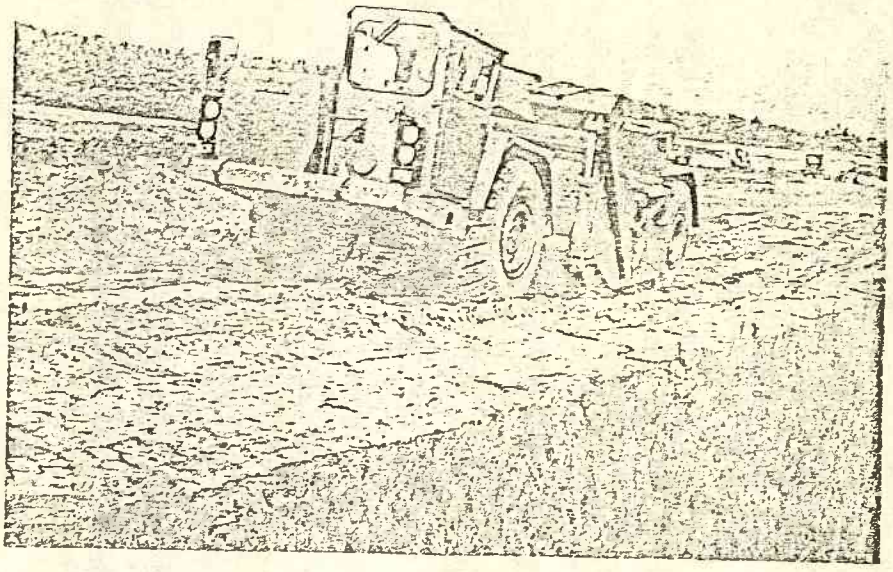
The all-up weight of the tractor in its heaviest form is 34·6 tonnes, to meet a requirement for road transport on a 35 tonne trailer.

Engine: Detroit Diesel 8V-771T
Flywheel power: 194 kW (260 hp) at 2100rev/min
Transmission: Allison CRT 6031 powershift

TS-8 motor scraper

This is the smallest twin-powered scraper in the range with a struck bowl capacity of 6·1 m³. It is used by the British Army in its medium motor scraper role and offers a high degree of versatility in application, good self-loading performance and excellent traction in bad terrain. The even distribution of weight in TS-8 gives the optimum bowl size for air transport in the C130 and unrestricted road use. Automatic transmissions simplify training and enable unskilled operators to achieve good outputs.

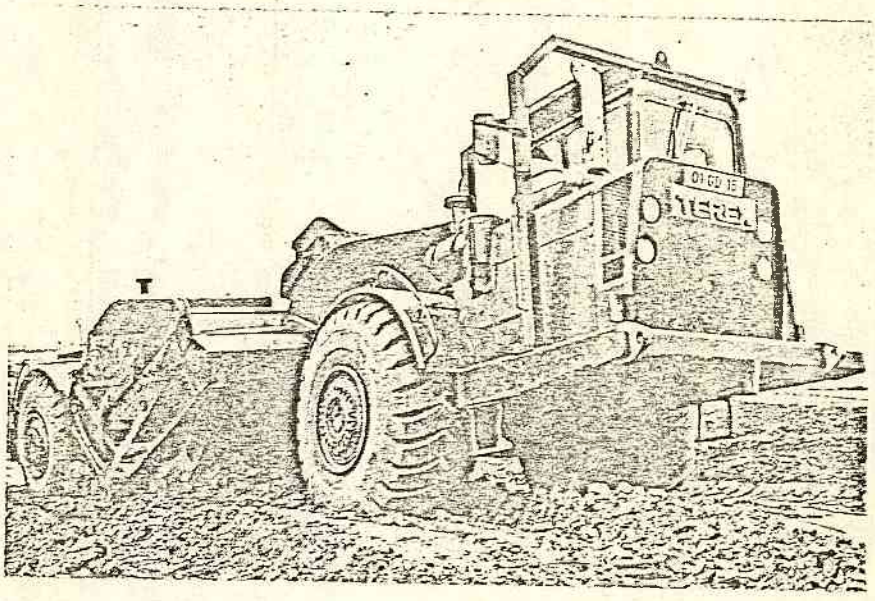
Engines: Two Bedford 5·4 litre (330 in³)
Flywheel power: 137 kW (184 hp) at 2500 rev/min
Transmissions: Two Allison MT650 automatic
Payload: 10 450 kg



TS-14B motor scraper

This versatile and productive machine is well suited to medium-length hauls in military construction tasks such as airstrips, bridge approaches, route diversions, track maintenance, etc. It is in service with the British Army in the heavy motor scraper role.

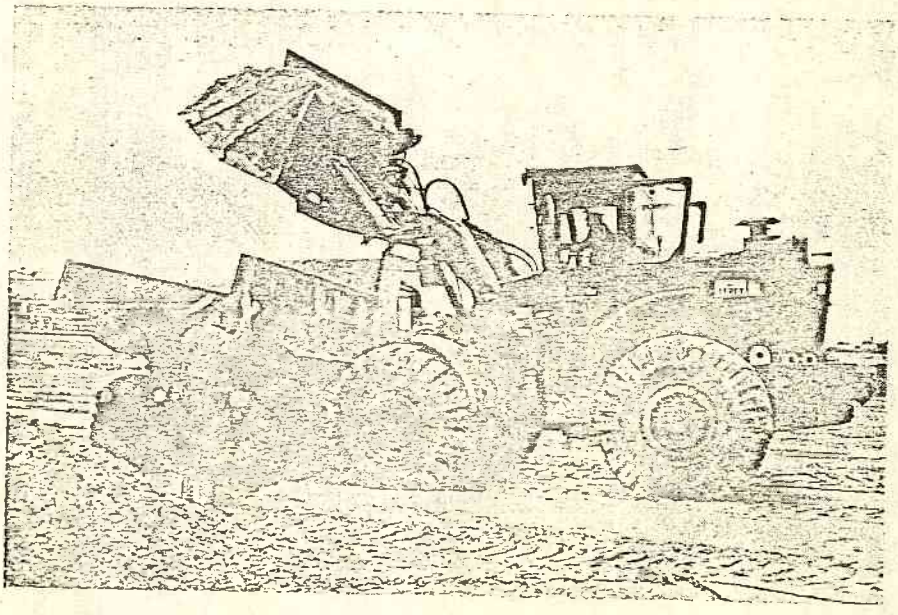
Engines: Two Detroit Diesel 4-71
Flywheel power: 214 kW (288 hp) at 2100 rev/min
Transmission: Two Allison CLT-3461 powershift
Payload: 21 320 kg



72-51 MWT loader

This is the largest loader which may be carried in the C130 aircraft in stripped but mobile condition. It complies with most countries' traffic laws for unrestricted road use. The special military version, shown left, is fitted with a 4 in 1 bucket of 2·7 m³ capacity, front-mounted winch, ripper and rollover cab. It entered service as the British Army's standard medium wheeled tractor in 1977.

Engine: Detroit Diesel 6-71N
Flywheel power: 145 kW (194 hp) at 2100 rev/min
Transmission: Allison TRT 4820 powershift
Full turn tipping load: 11 200 kg



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TEREX GM

TRADUCCION - APENDICE

Cargador 72-51 MWT

Este es el cargador más grande que puede ser transportado en un C-130, desmontado pero en condición móvil. Cumple con la mayoría de las leyes de tráfico de los países para uso en los caminos sin restringciones. La versión militar especial, está equipado con una pala de 4 pulgadas y de 2.7 m^3 de capacidad, con un malacate frontal montado, rasgador y casilla del conductor. Entró en servicio en el ejército inglés como tractor mediano standard, a ruedas, en 1977.-

Apendice 28

Truck self-loader crane

Universal self-contained hydraulic unit

The Atlas hydraulic loader/crane, in conjunction with a PTO (power-take-off) and pump, forms a self-contained unit for truck self-loading, off-loading, and cross-loading to other vehicles.

It is a simple one-man operated equipment designed for ease of handling heavy loads, obviating risk of injury involved in man-handling and, not having to depend on other cranage, for reducing non-productive truck standing time.

Except for rare instances when additional manipulated jib extensions may be required, all Atlas cranes are fully hydraulic with all-double-acting rams as standard. With control valve levers at waist height level and duplicated for operation on either side of the truck, precise control is effective to stabiliser legs, slewing (usually through 390°), main boom, jib, and telescopic extension of jib.

In addition to hook and sling use, various types of grab for handling special products can be provided. An extra control valve and circuit are required to operate the grab, and in some instances another control to rotate the grab on its pivot at the jib end. Electronic or hydraulic controls can be fitted to all Atlas cranes. Control may be by wander lead or (as for British forces' trucks) at the cab hatch; with mid- or rear-mounted cranes operation is by controls at a seat mounted on the crane column.

The crane is mounted transversely across the truck chassis. Most models require a space of 600 mm between rear face of cab and body headboard, or at any other position along the chassis, as preferred. The larger AK 5002 and AK 6000 cranes require a space of 700 mm.

High-tensile bolts secure the crane to brackets fixed to the sides of chassis members or sub-frame, and hydraulic hose connections are made to the pump operated by a PTO on the main or auxiliary gearbox. The design of most models permits folding of the crane hydraulically into the space referred to for transit, otherwise the boom and jib are extended along the length of the body or over the load.

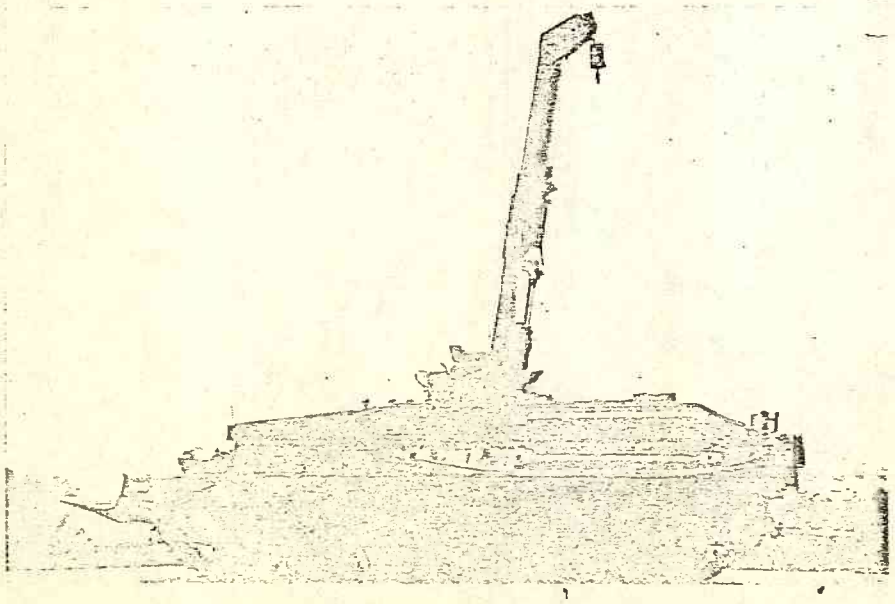
The crane can be mounted on any commercial truck provided the tare weight of the vehicle is adequate to take the appropriate model. As a general guide the AK 3006 crane may be fitted to trucks of a tare weight of 3·5 tons and over. Large numbers of Atlas truck self-loader cranes are in use by the British and German armies.

The following brief load table, referring to seven models from the extensive range, is given as a general guide to assessing requirements. Each model is available in several different versions with different reach and load capacities achieved by varying configurations of boom and jib to suit individual requirement.

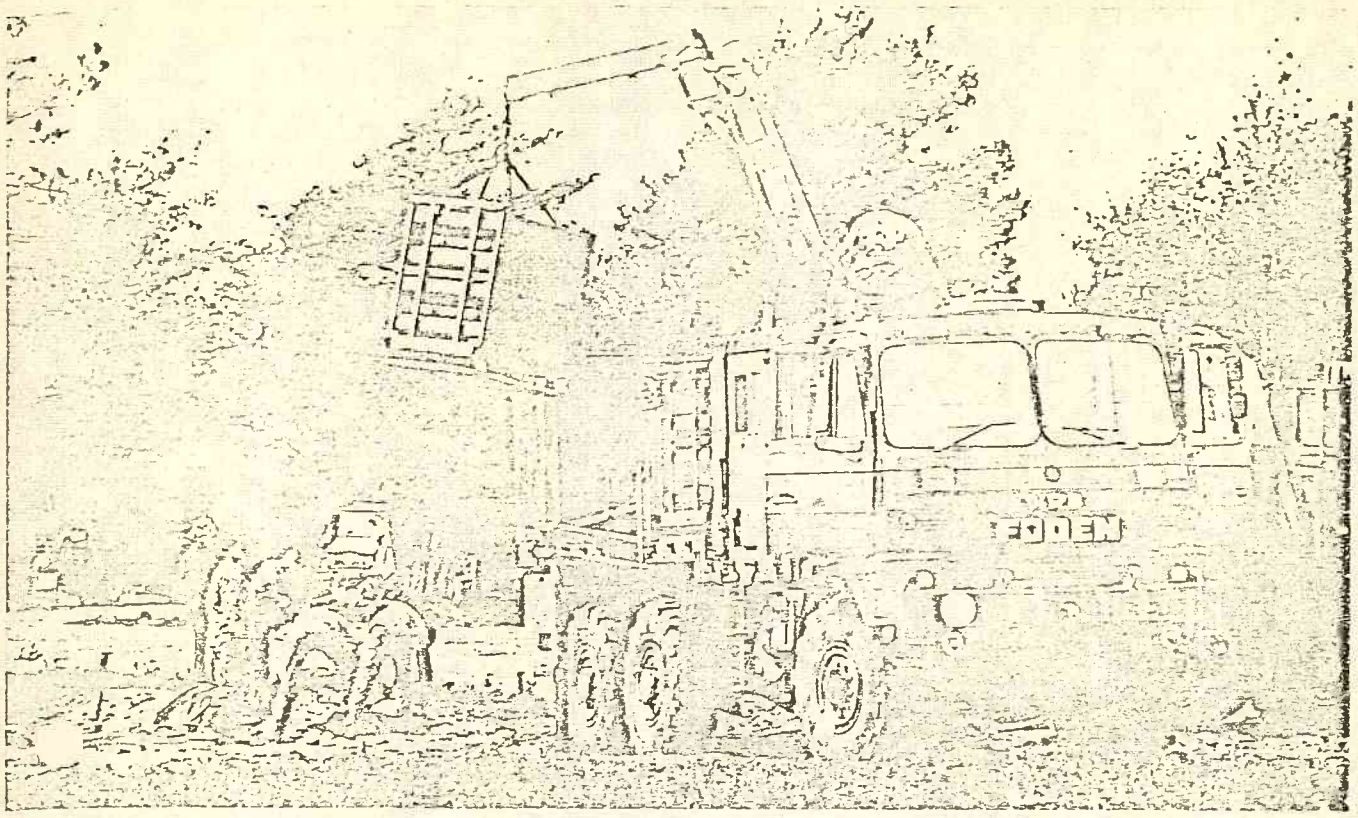
Atlas cranes can also be mounted on naval and merchant ships, military tractors, mobile concrete pumps and, fitted with motor and pump, as self-contained crane on a static base.

Atlas also manufactures a range of 360° continuous slewing hydraulic excavators and front loading shovels.

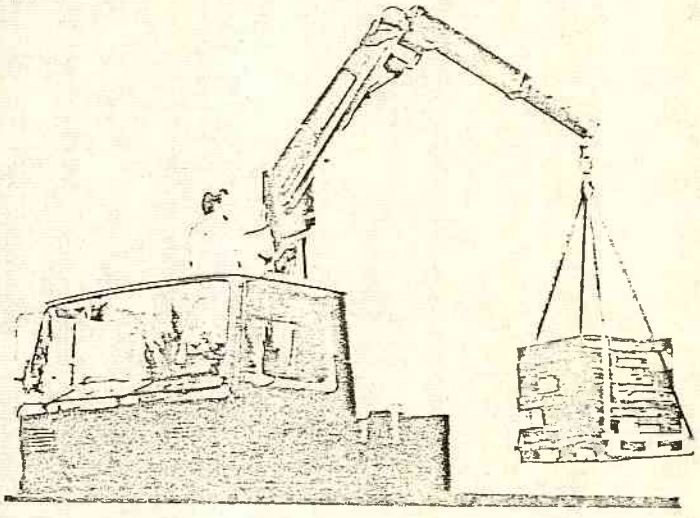
Model	Safe working moment up to: metre/tons	Safe working load up to: kg	Maximum reach and safe working load at max reach	
			metres	kg
AK 852	2·0	1130	3·00	660
AK 1402	4·0	2100	7·86	420
AK 3006A	6·5	3500	10·47	560
AK 3006HD	8·5	4064	5·18	1554
AK 3500A	8·0	3980	11·78	580
AK 4002	10·8	5560	16·90	350
AK 4006	10·5	6500	11·01	740
AK 5002	20·2	6100	16·98	660
AK 6000	26·6	9000	18·33	750
AK 6500	34·0	3500	19·2	900



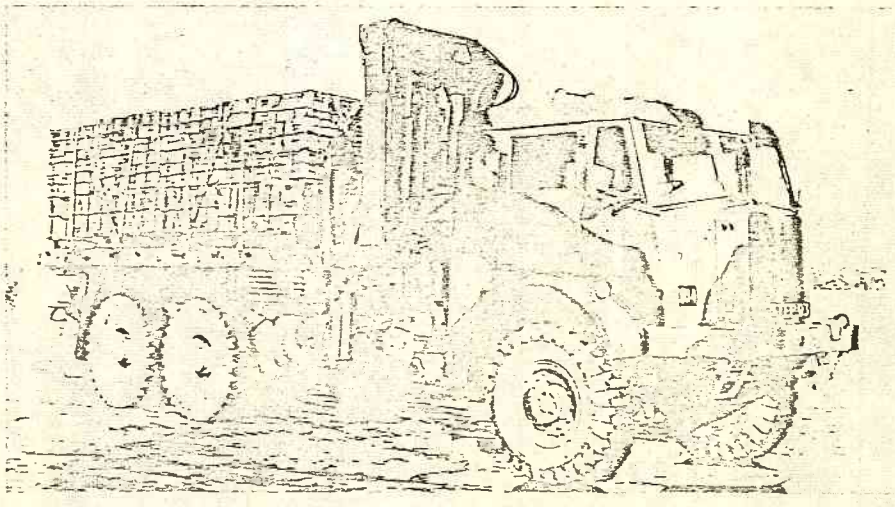
Atlas AK 6000M crane mounted on



Atlas AK 3006/FH70 crane as mounted on Foden medium-mobility gun tractors and limbers for handling gun crew cabins, stores containers and palletised ammunition. The crane has a capacity of 1200 kg at 5·1 m

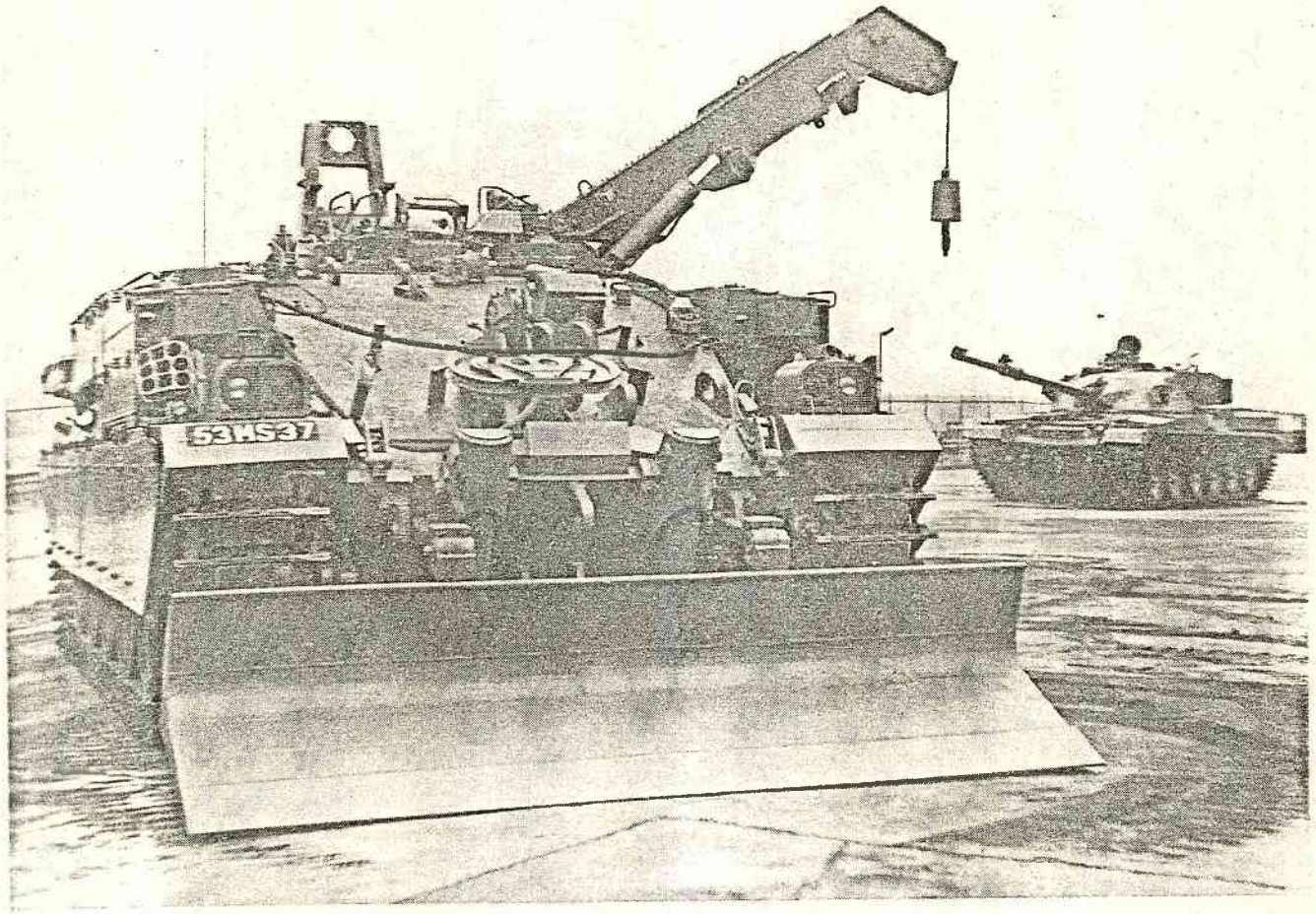


Atlas AK 3500 mounted on a Bedford TM 4 × 4 truck. Contracts for large numbers of this crane for the new British Army 8-tonne truck have been placed by Vauxhall Motors. Capacity of the crane is 18[illegible] kg at 4·32 m



Atlas AK 4000 L mounted on an AEC Militant 10-ton 4 × 4 truck. Almost 300 of these units have been supplied to the British Army. They have a capacity of 3150 kg at 2·83 m radius, or 1560 kg at 5·58 m

ATLAS HYDRAULIC LOADERS LIMITED
Vere Road, Blackwood, Kirkmuirhill, Lanark, Great Britain, ML11 9RR
Telephone: Lesmagagow (0555) 893281



The increased mobility of modern armoured formations makes it all the more important for armoured fighting vehicles, particularly main battle tanks immobilised either through mechanical breakdown, adverse terrain conditions or enemy action, to be recovered speedily and efficiently.

The armoured recovery vehicle (ARV) must have mobility comparable to that of the armoured forces it supports and a sufficiently high level of armoured protection to enable casualties to be recovered under fire. These requirements lead to the use of a tank chassis, with special equipment mounted on it, as a basis for ARV design.

The Chieftain and Vickers ARV provides a capability in all recovery tasks associated with combat operation of battle tanks, and has in addition a traversing crane capable of lifting a total weight exceeding that of a complete power pack.

In the UK, Vickers Limited Defence Systems Division manufactures both the Chieftain ARV and an ARV based on the Vickers main battle tank chassis and has the required skills to design and supply recovery vehicles to conform to customers' requirements.

The ARV combines in a single vehicle the capability of undertaking a wide range of tasks which in the past have required the use of more than one vehicle. It is now possible, for example, to recover a vehicle, tow it to a suitable location, remove and replace its power pack and enable it to return to combat in the shortest possible time. The low silhouette, high level of protection, front winching facility, and the sight vision capability for both driver and commander ensure that the ARV can perform all these tasks in the battlefield under fire both by day and by night.

The Chieftain ARV is capable of towing disabled battle tanks of up to 60 tonnes (59 tons) weight over all types of terrain, and has earned high praise from the British Army on its performance in this role.

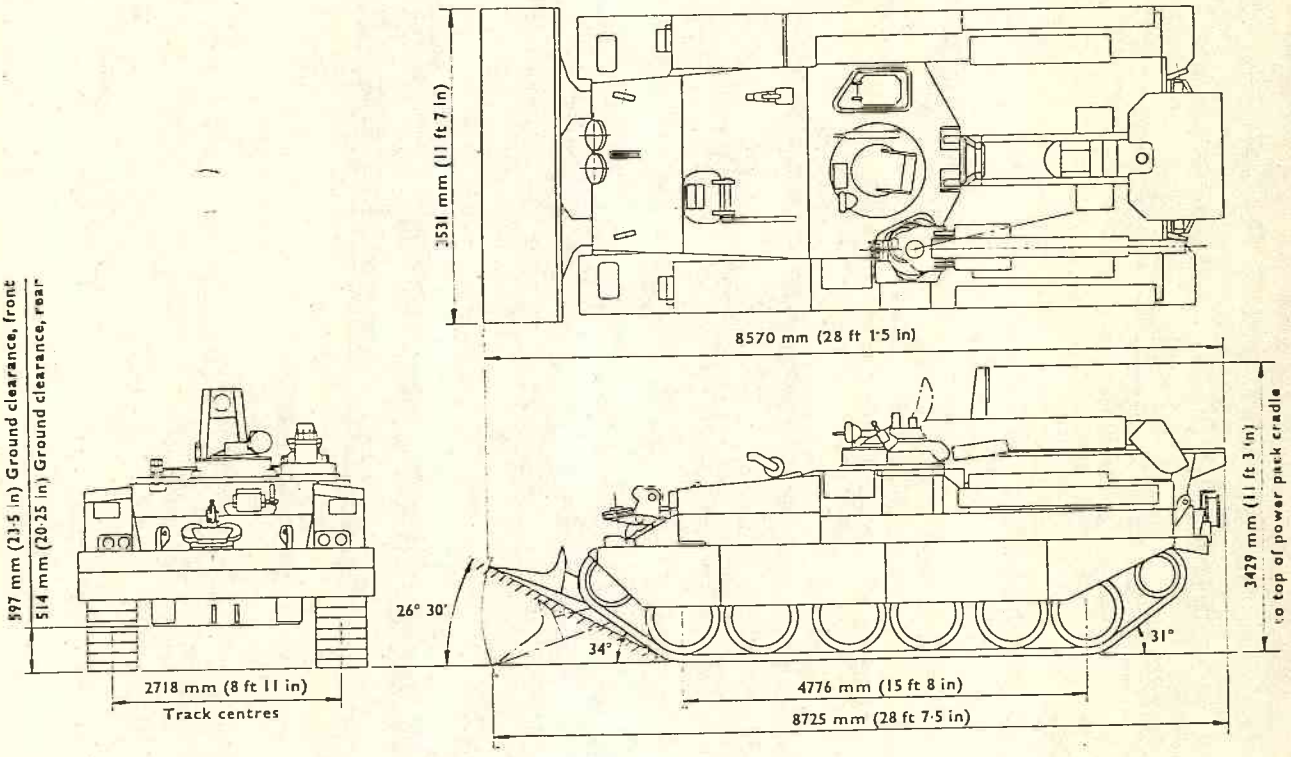
It is based on the Chieftain battle tank and uses common components. The hull (up to track guard level) is identical with that of the battle tank and provides exactly the same ballistic immunity.

VICKERS LIMITED
Defence Systems Division
Elswick Works, Newcastle upon Tyne, Great Britain, NE99 1CP
Telephone: Newcastle upon Tyne (0632) 738888
Cables: Vicastrong Newcastle upon Tyne Telex: 53104

Apendice 29

Chieftain

armoured recovery vehicle



The Chieftain recovery vehicle is an advanced tracked armoured vehicle designed to recover battle tanks and other heavy vehicles up to 60 tons in weight under combat conditions. It can also be used for other subsidiary tasks.

Features

The vehicle includes the following features:

Chieftain tank automotive components:

A main winch with a direct line pull of 30 tons. A pull of 90 tons is available using a 3:1 pulley system carried on the vehicle. A rear pull facility is provided for self-recovery.

An auxiliary winch with a direct line pull of 3 tons and of 9 tons using a 3:1 pulley system. Two speeds of operation are provided. This winch provides for a rapid and easy deployment of the main winch rope and can be used for light recovery tasks.

A combined earth anchor and bulldozer, hydraulically powered.

A crane and power pack cradle. The crane is hydraulically powered and can lift 5803 kg (5·7 tons) at a reach of 3·62 m (11 ft 10¼ in) with a traverse of 180 degrees.

Specification

Crew: 4—commander, driver/winch operator, radio operator, recovery mechanic.
Vehicle weight (with crane): 56·0 tonnes (55·1 tons)

Dimensions

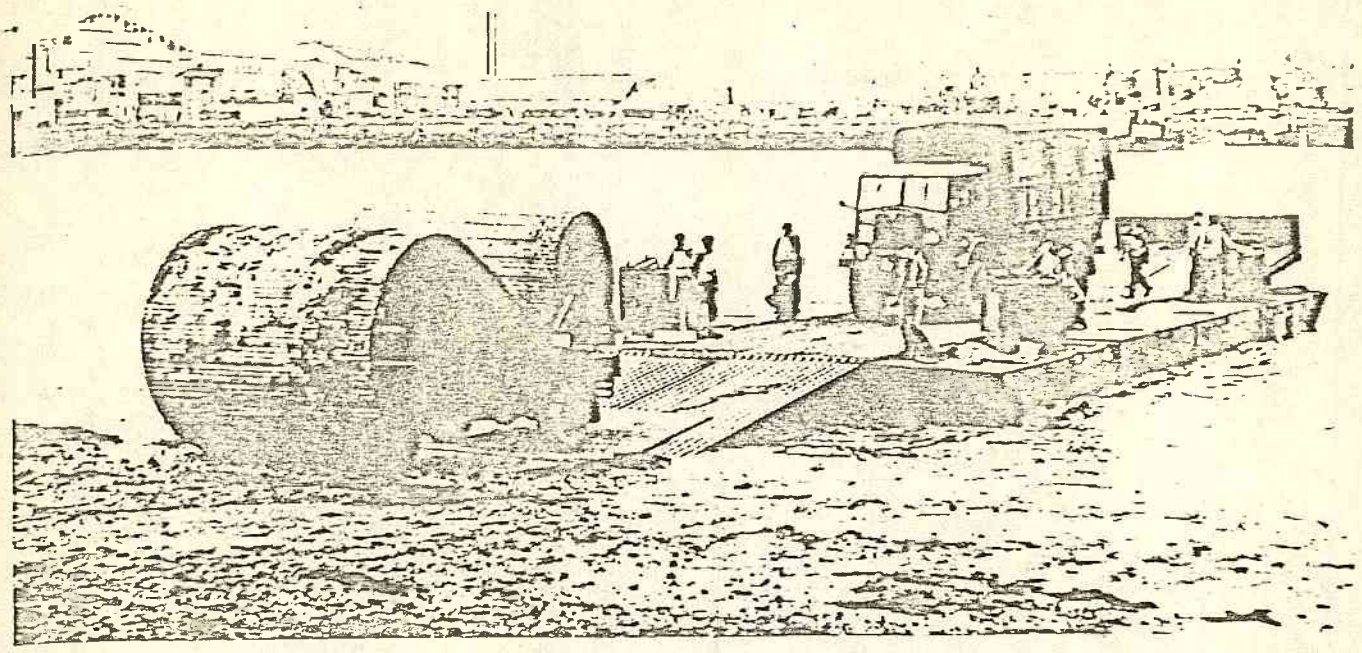
Length in travel conditions (with blade): 8570 mm (28 ft 1·5 in)
Height: 2790 mm (9 ft 2 in)
Width over track: 3330 mm (10 ft 11 in)
Width over blade: 3530 mm (11 ft 7 in)
Ground pressure: 96 kg/cm² (13·68 lb/in²)

Automotive performance

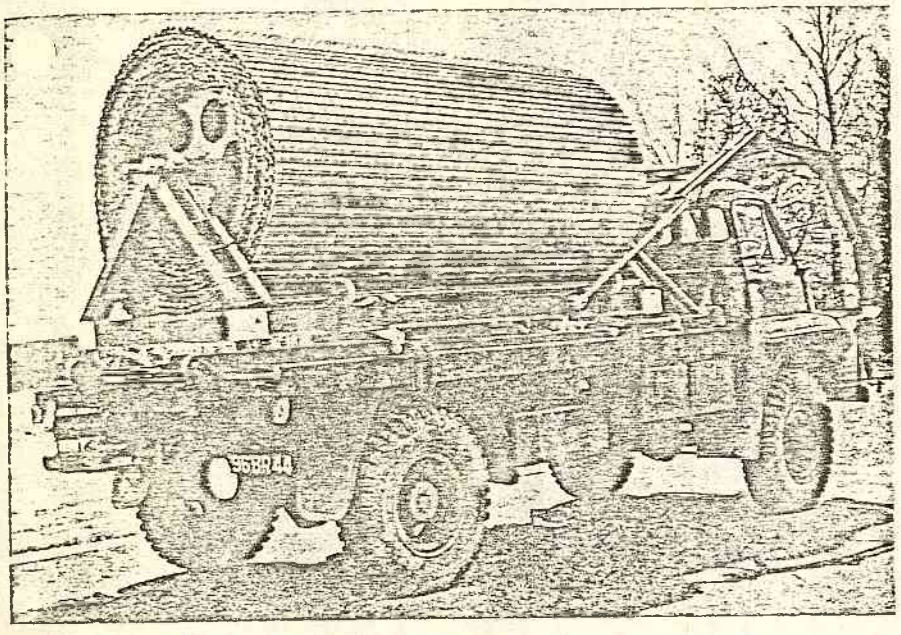
Engine type: Leyland L60 No 4 Mk 8A
Max road speed: 42·4 km/h (26·4 mph)
Road range: 400–500 km (284–310 miles)
Cross-country range: 200–300 km (124–186 miles)

Transmission

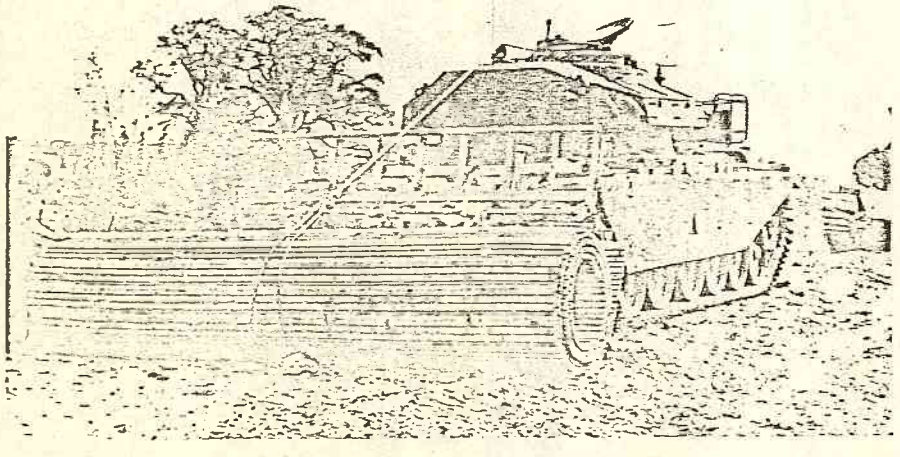
Gearbox: TN 12 Mk 4
Clutch: Centrifugal
Steering: Merrit regenerative



Class 30 Trackway is specified as standard military equipment in many countries. Launching is normally carried out over the front of the vehicle in a few minutes by a team of three men. Class 30 Trackway being laid on to a soft mud beach from a military ferry is shown above



A roll of Class 30 Trackway may be transported on any suitable 5-ton flat platform truck. The roll is mounted on a spool and turntable which permits the trackway to be positioned within the length and width of the vehicle without overhang. When the operation is complete, the launching equipment can if necessary be quickly removed, so releasing the vehicle for other duties



The demand for a heavy-duty quickly assembled roadway capable of supporting both tracked and wheeled vehicles is met by the Class 60 Trackway. It is commonly used at the approach to and exit from temporary bridge and ferry sites and, in conjunction with Class 30 Trackway, is ideal for operations involving the combined use of tracked and wheeled vehicles. Shown here is a roll of Class 60 Trackway being winched on to a tank

LAIRD (ANGLESEY) LIMITED
Beaumaris, Gwynedd, Great Britain, LL58 8HY
Telephone: Beaumaris (0248) 810431 Cables: Searoads Beaumaris Telex: 61295

P1

Appendice 30

Portable roadways

truck-laid and heavy-duty types

Class 30 and Class 60 Trackway are portable non-skid surfacings designed for use on soft ground where conditions would become increasingly difficult with continual traffic and eventually result in total immobilisation of vehicles and mobile equipment.

Both classes of Trackway are engineered for easy transportation and rapid handling so that they can be placed quickly and effectively by the minimum number of men.

Trackway can be easily taken up after use, transported elsewhere and re-laid. Simplicity of construction and the use of aluminium alloy planks result in a very low maintenance and replacement factor.

Laird (Anglesey) Limited manufactures and supplies all components for these portable roadway systems.

The aluminium alloy (HE 30 TF) section used for Class 30 and Class 60 Trackway were developed by the British Ministry of Defence in collaboration with The British Aluminium Co Ltd, and are fabricated and marketed by Laird (Anglesey) Ltd.

Class 30 Trackway

Application

Class 30 Trackway is designed for wheeled vehicles and for tracked vehicles with rubber pads. Heavier vehicles can use the Trackway when ground conditions are favourable and tanks up to Class 50 may cross at an angle provided they do not slew while on the track.

Class 30 Trackway is a simple, quick and highly efficient means of maintaining vehicle movement over soft ground, particularly in conjunction with amphibious or other temporary bridges where its application extends the choice of crossing point.

One of the main features of Class 30 Trackway is that it can be launched and recovered by the transport vehicle and can therefore be put into use without delay.

Assembly

Class 30 Trackway is assembled from a number of extruded aluminium alloy planks with interlocking captive tongue-and-groove joints, forming a continuous non-skid surface 3·35 m (11 ft) wide and normally 49·95 m (150 ft 9 in) long. This standard Trackway length is reeled on to a carriage assembly transported by normal platform trucks. Class 30 Trackway is launched from the truck and later recovered on to the truck.

The spool carrying the length of track is mounted on a frame and turntable assembly which clamps to the truck platform. This arrangement permits the equipment to be stowed within the vehicle dimensions or swung to the launching and recovery positions.

Launching

Class 30 Trackway is launched forward over the truck cab, using a quickly fitted removable roller frame launching assembly. The track may also be launched over the rear of the truck. The preparation and launching operation can be completed in about ten minutes by a three-man team.

Recovery

Class 30 Trackway is recovered over the rear of the vehicle, being rewound on to the spool by ratchet levers. Roller supports clamped to the rear of the truck platform support the track clear of the truck. The recovery operation can normally be completed in 10 to 15 minutes by a four-man team.

Dimensions and weights

Standard Class 30 Trackway
Length: 45 95 m (150 ft 9 in)
Width: 3·35 m (11 ft)
No of planks: 201
Weight per m(ft) run: 62 kg (45 lb) approx
Individual plank: 3·35 × 0·23 m (11 ft × 9 in) 14·9 kg (33 lb)
Carriage assembly: 760 kg (1672 lb) approx
Launching assembly: 340 kg (750 lb) approx
Recovery equipment: 41 kg (92 lb) approx
Total weight trackway and components: 4218 kg (9298 lb) approx

Class 60 Trackway

Application

The Class 60 heavy-duty Trackway is designed for both tracked and wheeled vehicles. In general it is used to support tanks over very soft ground and in areas of large vehicle concentrations such as may occur at bridge and ferry approaches, at the entry and exit to marshalling areas and other areas subject to heavy traffic.

Class 60 Trackway is also used to protect Class 30 Trackway at tank crossing points.

Class 60 Trackway is quickly and easily assembled and the components can be transported in quantity by standard trucks.

Class 60 Trackway has also been developed as an 'instant' hard surface for repair of bomb-damaged airfield runways.

Assembly

The heavy-duty Trackway is assembled from interlocking extruded aluminium alloy planks made in two sizes: 4·57 × 0·23 m (15 ft × 9 in) and 2·28 × 0·23 m (7 ft 6 in × 9 in). These dimensions enable a continuous load-carrying mat to be assembled quickly over areas of soft ground. The method of assembly is by sliding individual planks together successively and engaging a simple locking device. An access mat area 18·3 × 11·6 m (60 × 38 ft) can be assembled in four hours by ten men. A pre-assembled length of Class 60 Trackway 7·6 × 4·6 m (25 × 15 ft) secured in a roll is easily laid and recovered by ten men. Tanks are driven on to the mat over the longitudinal lay of the planks. Slewing can take place once the tracks are fully on the mat.

Transport

Class 60 Trackway component dimensions permit transport in quantity by standard trucks and easy handling at both loading and application points.

Two 3-ton trucks can transport components for assembly of a trackway area measuring 18·3 × 11·6 m (60 × 38 ft). Components for assembling a roadway 15·3 m (50 ft) in length and 4·6 m (15 ft) wide can be loaded on one 3-ton truck as loose planks or as a single pre-assembled roll or as two pre-assembled rolls each 7·65 m (25 ft) long.

Dimensions and weights

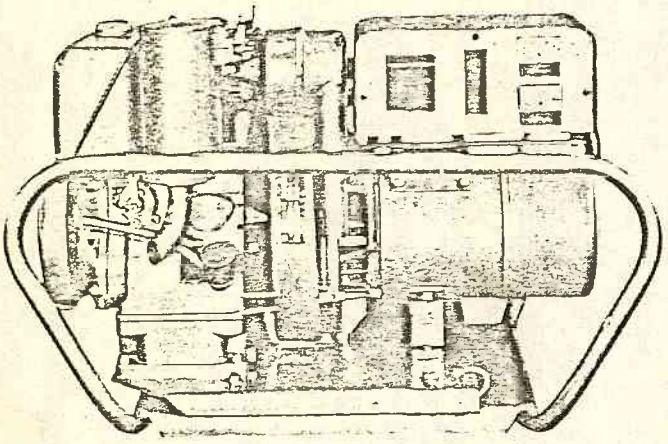
Typical Class 60 Mat
Length: 18·3 m (60 ft)
Width: 11·6 m (38 ft)
Area: 212 m² (2280 ft²)
Weight per m² (ft²): 34 kg (7 lb)
Total weight: 7182 kg (15 960 lb)

Typical Class 60 Track
Length: 15·3 m (50 ft)
Width: 4·6 m (15 ft)
Weight per metre (ft) run: 144 kg (105 lb)
Total weight: 2385 kg (5300 lb)

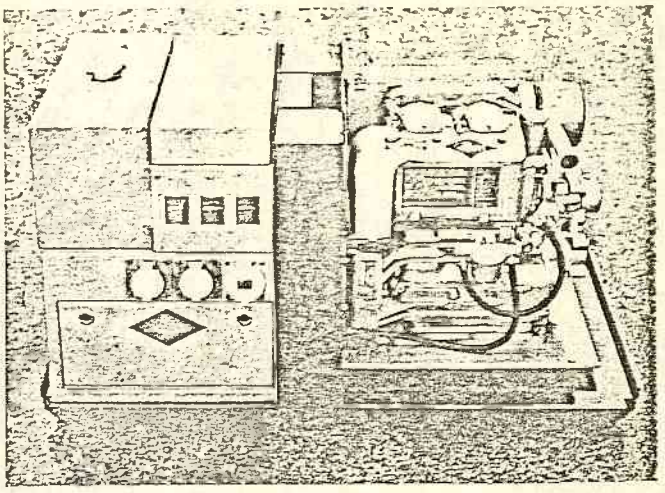
Individual planks
Long plank—Length: 4·57 m (15 ft) Width: 0·23 m (9 in)
Weight: 33·07 kg (73 lb)
Short plank—Length: 2·28 m (7 ft 6 in) Width: 0·23 m (9 in)
Weight: 16·76 kg (37 lb)

Diesel power generators

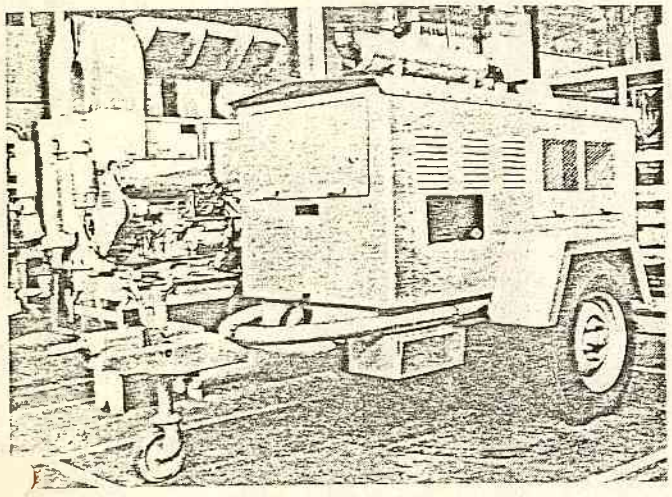
for stationary, mobile, base load and standby use



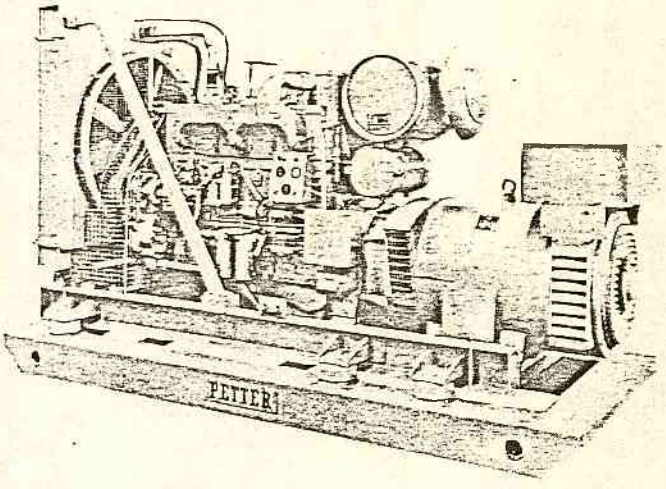
Petter 4 kVA portable unit



Petter 7·5 kVA portable unit



Petter 27 kVA mobile unit



Petter 253 kVA semi-portable unit

Petter Power Generation Limited, as part of the international Hawker Siddeley Group, has the backing of powerful financial and technical resources and is able to draw on valuable experience and expertise gained over many years of competitive operations. The company has its own extensive facilities and experienced personnel, trained to meet the specific challenges and requirements of the world's military markets for electric power, within its range of diesel generating equipment from 1·5 to 1200 kVA.

Units are available in stationary, portable, self-contained and mobile arrangement, incorporating Petter engines and other internationally known diesel engines to meet the specific requirements of defence and military organisations. Outputs are available at 50/60 Hz or 400/425 Hz, over a wide range of voltages.

All equipment is subject to stringent and thorough inspection procedures and test codes to maintain the highest level of quality and to ensure maximum reliability within a military environment.

Comprehensive training facilities are available at the Petter Power Generation Service School in the Hamble factory, where multi-lingual classes are regularly held. Courses can be specifically prepared for on-site training.

The company provides a worldwide network of sales and service facilities through a strong distributor organisation, backed up by a team of service supervisors who continually visit distributors and customers in all parts of the world.

A member of the Hawker Siddeley Group
PETTER POWER GENERATION LIMITED
Hamble Lane, Hamble, Southampton, Great Britain, SO3 5NJ
Telephone: Hamble (042 122) 2061 Cables: Petter Hamble Telex: 47626

1978

Apendice 32

Refuelling units

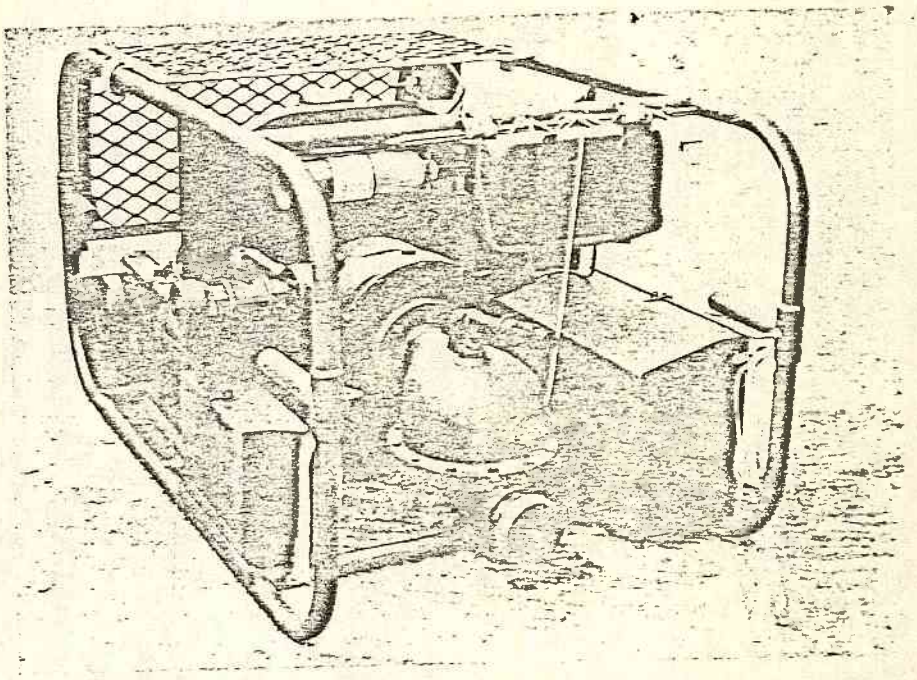
with powered and hand-operated pumps

Fluid Transfer specialises in the design and manufacture of lightweight portable aircraft fuellers for the British and other governments and civil operators. The units are in service throughout the world and are capable of operating under all climatic conditions.

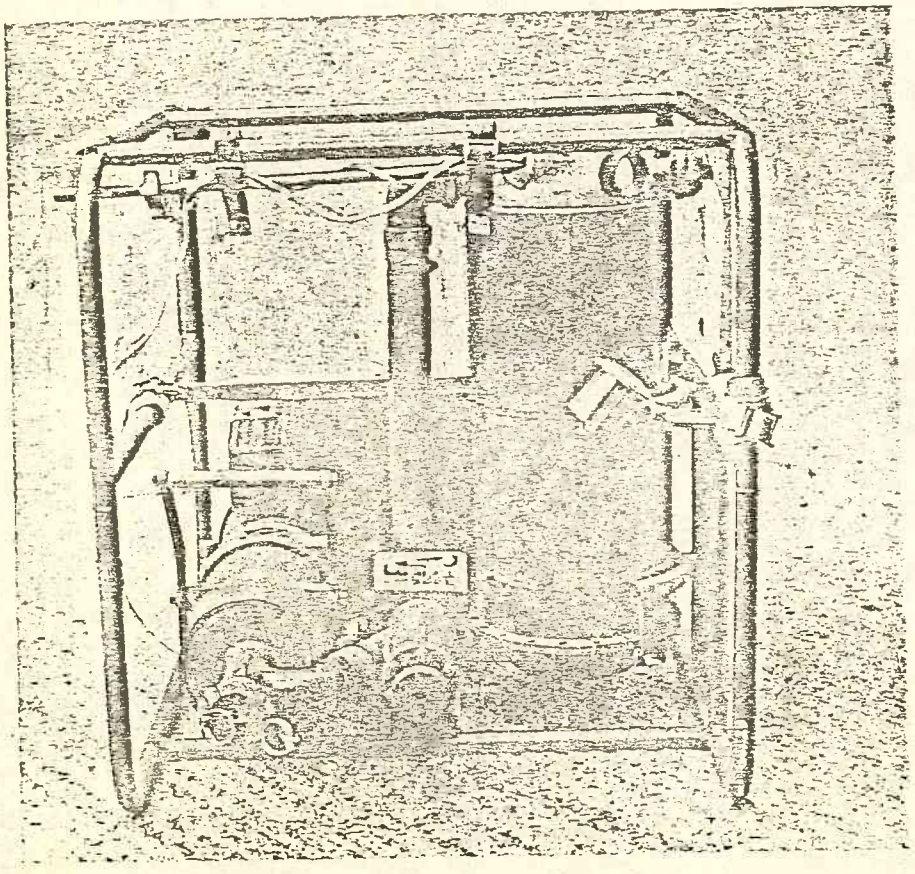
Filter/water separators can be supplied to British or American specifications and are matched to the type of fueller in use.

Multi-purpose fueller Type 15050

This unit is available with either a four-stroke lightweight diesel or petrol engine, and is designed for multi-purpose use of pressure and overwing fuelling of modern tactical aircraft and all types of helicopter. It operates at pressures from 0 to 4 bar (0–60 lbf/in²) and is rated at 0 to 1000 litres/min (0–220 gal/min). The pumpset features self-priming run-dry capability and is especially suited for use with flexible containers of any size, air portable containers and underground storage.



Fueller Type 15050 Mk 3 with petrol engine in its carrying frame



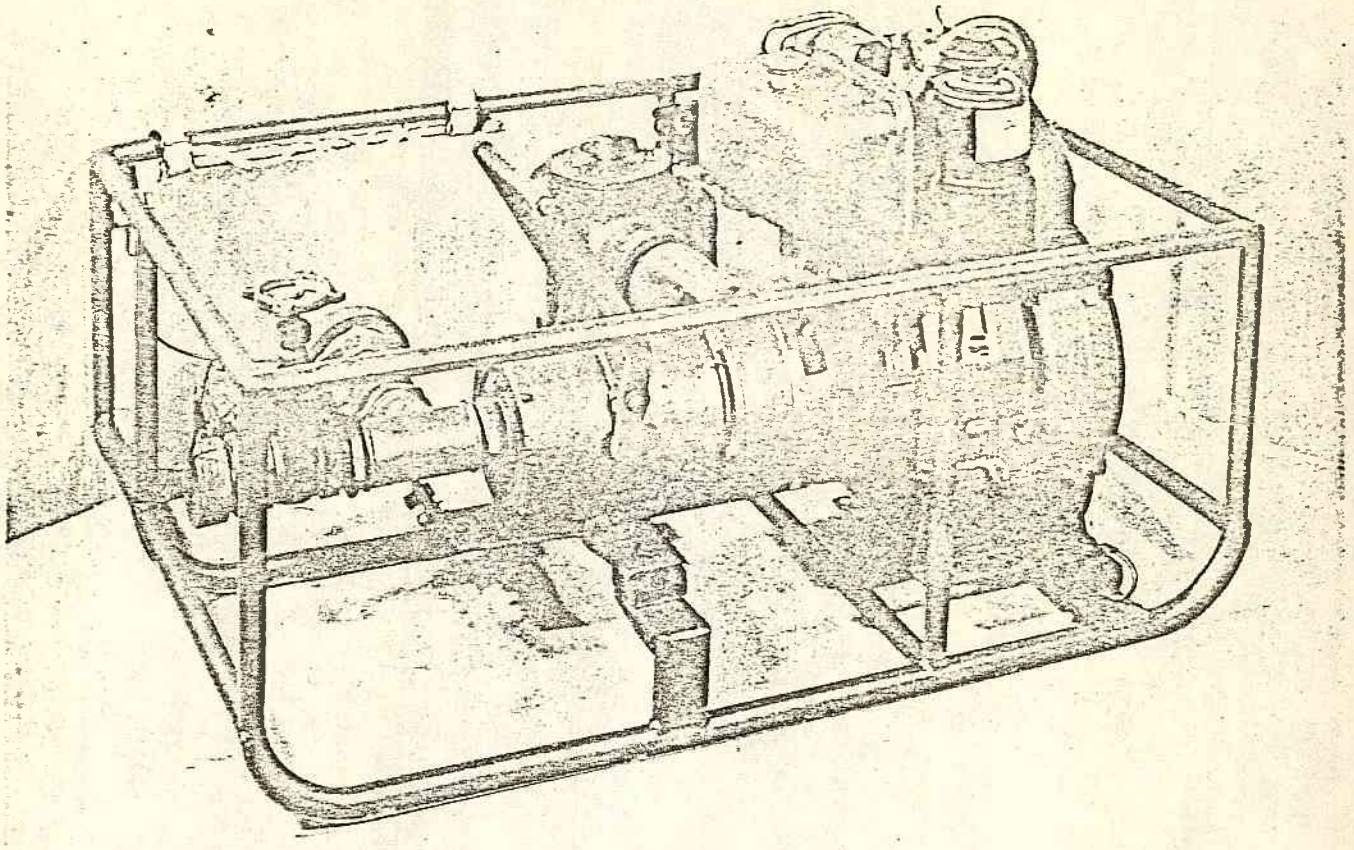
Lightweight fueller Type 5020

The portability of this unit, which weighs only 77 kg (170 lb) in its lightest form complete with filter/water separator, makes it versatile and easily operated under all conditions.

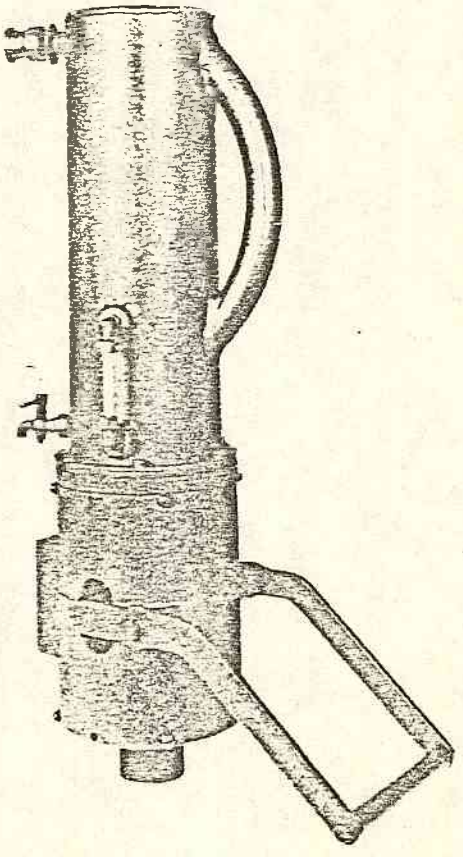
Designed specifically for helicopters and light/medium aircraft, it is rated at 0 to 270 litres/min (0–60 gal/min) and operates at up to 2 bar (30 lbf/in²). Fitted with either a lightweight four-stroke petrol or diesel engine close-coupled to a pump unit with a self-priming and run-dry capability, it operates successfully from air-portable containers, drum stock and flexible containers.

Fueller Type 5020 with petrol engine and filter/water separator

P4



Fueller Type 5020 with diesel engine



Hand-operated refueller Type HP4 Mk 2

Hand-operated fueller Type HP 4

This hand-operated unit weighs only 14 kg (31 lb), is portable and is fitted with an integral 5 μm filter/water separator. Output is 45 litres/min (10 gal/min). It is supplied complete with standpipe, delivery hose, nozzle and canvas carrying case.

All pumpsets are supplied with suction and delivery hose sets to suit customers' requirements. Also available is a large range of dry-break hose couplings and dispensing nozzles.

Bulk meters can be supplied mounted in a lightweight tubular carrying frame.

FLUID TRANSFER LIMITED
Griffin Mill Estate, Thrupp, Stroud, Gloucestershire, Great Britain, GL5 2AZ
Telephone: Brimscombe (045 388) 2209 Telex: 43401

Apendice 23

Flexible containers

for supplying fuels and water to forward bases

The supply of fuel and water to ground and air forces during operations has always posed considerable problems to the logistic services. IMI Marston Ltd offers a complete highly portable and easily operated system, based on reinforced rubber tanks and including all necessary pumping and associated equipment.

Portolite tanks

Marston Portolite tanks make the storage of liquids possible anywhere there is a flat area of ground. They are used to form tank farms to provide fuel on temporary airstrips and forward landing areas and are usually used for refuelling purposes in conjunction with our air-portable containers shown below. Tanks of 45 000 litres and 136 000 litres are extensively used by the British armed services for refuelling both aircraft and vehicles. When not in use, a Portolite tank can be rolled into a small bundle and stored or transported as required. Tanks with capacities from 2250 to 23 000 litres can also be used for the transport of liquids on trucks, trailers or rolling stock.

The external surface of the tanks has a high degree of resistance to abrasion, ozone, sunlight and petroleum.

Specification

Typical capacities: 2250, 3500, 5000, 6500, 8000, 10 000, 14 000, 23 000, 45 000, 136 000 litres

Dimensions of a 136 000-litre tank
- Full: 12·8 × 6·7 × 1·9 m
- Folded: 4·1 × 0·76 × 0·76 m

Weight empty: 567 kg

Air-portable containers

This flexible air-portable container (APC) has been developed by IMI Marston Limited for the transportation of all aviation fuels and conforms to the British Ministry of Technology Specification No AD/S and G/1677 E and P.

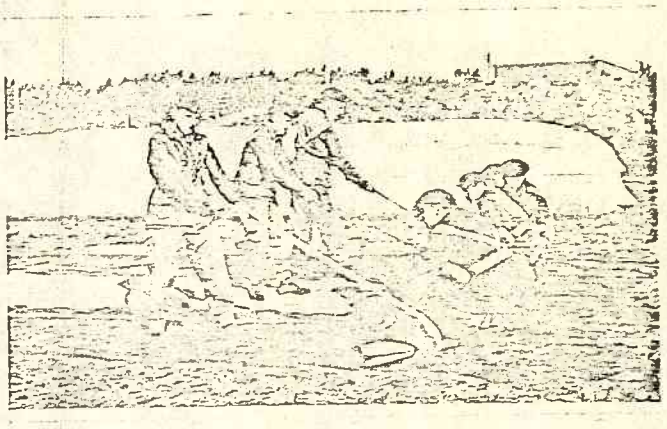
The Marston APC can be used for carrying fuel by pressurised or non-pressurised transport aircraft, can be lifted and moved by helicopter, para-dropped, carried on trucks, towed behind a vehicle and man-handled on the ground. It is sufficiently flexible to allow over 99 per cent of its capacity to be discharged and when empty occupies 12 percent of its filled size.

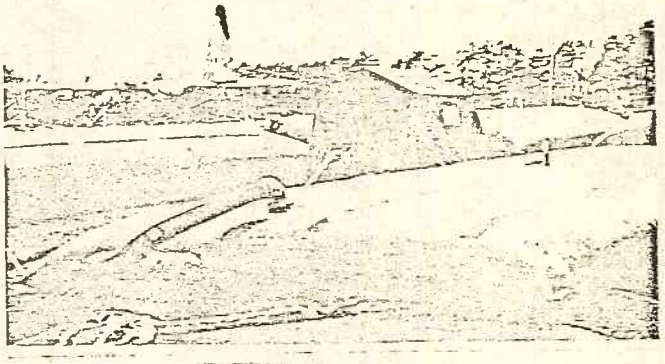
Fittings at each end of the container incorporate a bearing and swivel plate carrying lugs for attaching parachute and lifting harness, and a towing yoke.

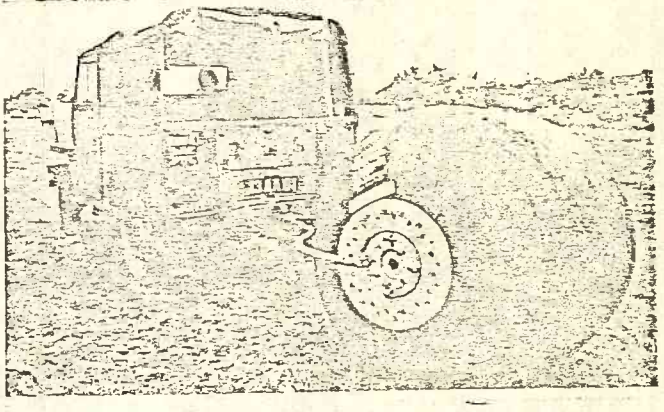
IMI Marston Ltd is assessed by the British Ministry of Defence to quality assurance DEF STAN 05-21.

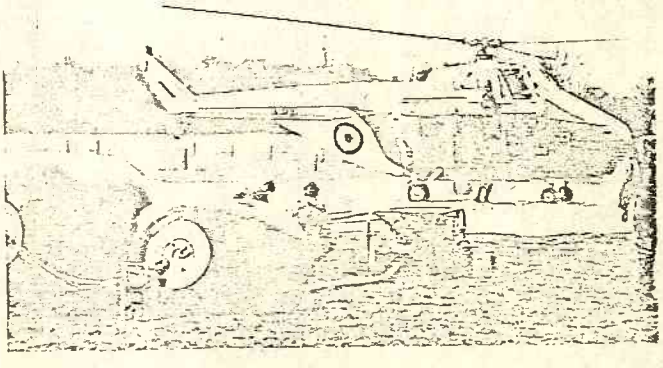
Specification

Capacity: 1930 litres (425 gal)
Overall length: 1·625 m (64 in) Diameter: 1·346 m (53 in)
Weight empty: 125 kg (275 lb) Weight full: 1650 kg (3670 lb)
Footprint load: 520 mb (7·4 lbf/in²)
Working pressure: 345 mb (5 lbf/in²)
Temperature range: +70°C to −26°C









A subsidiary company of IMI Limited

IMI MARSTON LIMITED

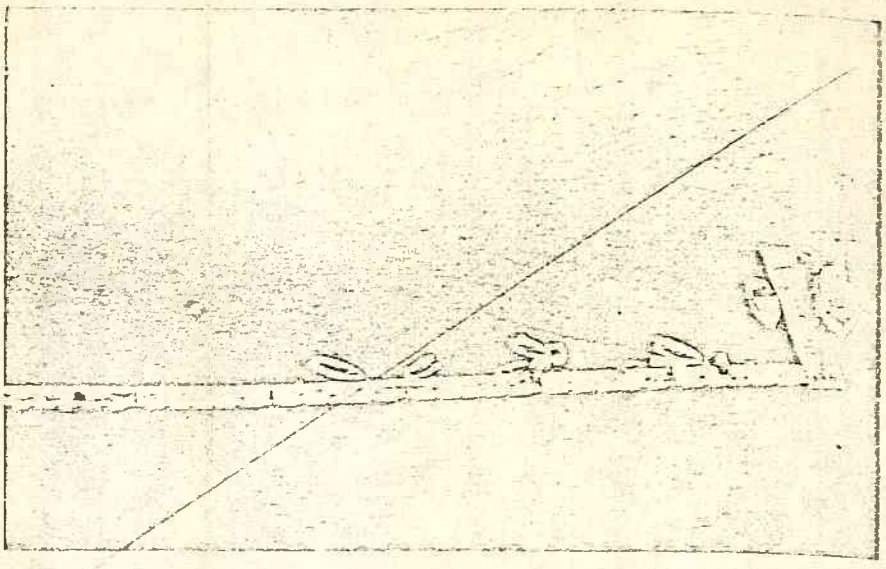
Wobaston Road, Fordhouses, Wolverhampton, Great Britain, WV10 6QJ

Telephone: Wolverhampton (0902) 783361 Cables: Marex Wolverhampton

IMI

Appendix 34

Modular pontoons for jetties and landing stages



CU PONTOONS

Concrete Utilities Ltd
Ware
Hertfordshire
Great Britain SG12 9TA
Telephone: Ware (0920) 2272
Telex: 81398 CU Ware

Concrete Utilities Ltd specialises in the design and manufacture of precast units of lightweight fibre-reinforced concrete, which combine high strength with long life. Experience gained in this field over many years has resulted in the modular pontoon which is ideally suited to a wide range of permanent or temporary military installations. Typical applications include jetties and landing stages permitting the embarkation of personnel and light equipment from shallow beaches into vessels of comparatively deep draft, the construction of river crossings, floating platforms, etc.

The pontoons are of unit construction so designed that they may be coupled end-to-end, side-by-side or in T-formation so that they can form a surface of virtually any shape.

Pontoons may be moored by anchors and chains or if a more permanent structure is required, by sliding brackets fitted round piles driven into the sea or river bed and then attached to the pontoons. The brackets permit the pontoons to ride the waves or to rise and fall with the tide.

The units are specially strengthened to allow them to ground in tidal waters without risk of fracture.

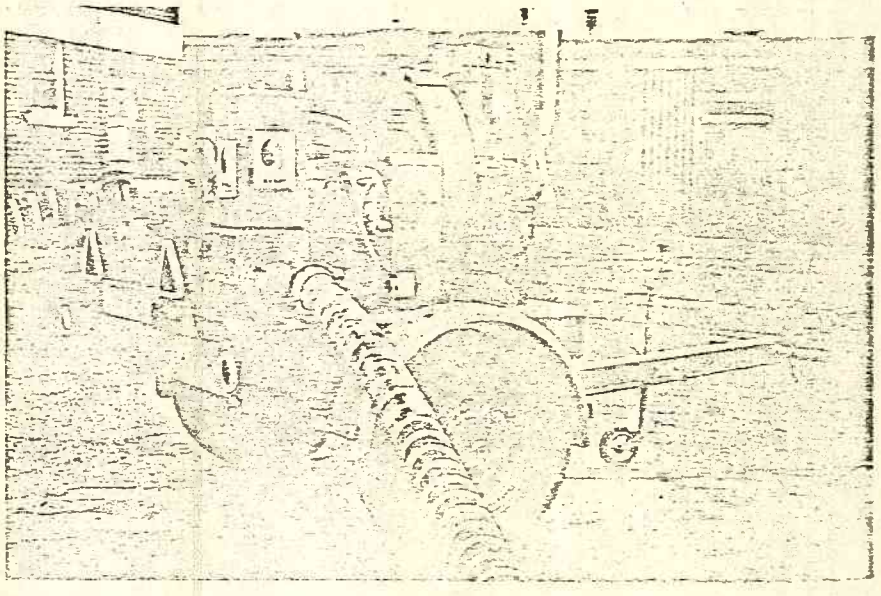
Ramps can be supplied to bridge the gap between the shore and the first pontoon.

Each unit has a length of 9 m, is 2·46 m wide and 0·8 m high and weighs 3·7 tonnes. The integral bouyancy chambers give the unit a freeboard of 0·5 m when unladen.

By using a combination of steel fibres and glass fibres to reinforce the concrete, the pontoons have sufficient strength to withstand arduous duties. They are easily handled by cranes of appropriate capacity and are easily transported in flat platform trucks. The reinforcing fibres also ensure that maintenance costs are minimal under any climatic conditions.

Concrete Utilities Ltd can provide advisory and design services for the assembly of any type of floating structure.

Trailer-mounted pumps for all temporary and emergency duties



SYKES PUMPS LTD

Woolwich Road
Charlton
London
Great Britain, SE7 7AP
Telephone: 01-858 8121
Cables: Univacpump London SE7
Telex: 25839

Sykes high-speed trailer units can be on the spot quickly and in operation in minutes, pumping night and day unattended to maintain dry and stable conditions within any flooded hole or excavation.

The Sykes Super Univac can prime and reprime automatically down to 9 m (30 ft) in less than one minute. Because the pumps are primed from behind the impeller, they have improved air handling capabilities and are ideally suited for gaseous sludges and slurries. The pumps are of modular construction giving the standard range custom-built advantages.

...pplications where an even greater ...ance and solids handling capacity ...ired, the Super Univac 100/HP ...HP are available.

The automatic vacuum-priming solids-handling pumps are available in bore sizes ranging from 50 to 200 mm (2–8 in) with outputs up to 400 m³/h (1480 gal/min) and heads to 55 m (180 ft).

Super Univac pumps save time by pumping from the top of an excavation, ditch, sump, drydock or sewer. Also, their ability to operate through suction pipelines over 100 m in length eliminates the need for frequent resiting of the pump.

Where intermittent flows are encountered, the pumps can run dry continuously without risk of damage and reprime rapidly and automatically to maintain liquid at the lowest possible intake level.

Overpumping blocked or damaged sewers and water supply lines, handling abrasive solids, sludge, slurries, unscreened sewage effluents with solids up to 75 mm (3 in) size are typical applications for which Sykes Super Univac pump sets are suitable. Various diesel or petrol engine drives can be fitted; trailers are generally suitable for public highway towing.

TRADUCCION - APENDICE

Bombas montadas en trailer

Son unidades de trailer de alta velocidad SYKES pueden estar rápidamente en posición y en operación en pocos minutos, bombeando día y noche para mantener condiciones secas y estables dentro de cualquier excavación o agujero.
El SYKES SUPER UNIVAC puede cebar y volver a cebar automáticamente a 9 m (30 piés) en menos de un minuto.
A causa de queclas bombas son cebadas desde atrás del impulsor, han sido mejoradas las capacidades del manejo del aire y se adaptan idealmente para suspensiones gaseosas y sedimentos.
Las bombas Super Univac ahorran tiempo bombeando desde arriba de una excavación, trinchera o dique de carena.
En lugar de flujo intermitente, las bombas pueden correr continuamente sin riesgo de daño y volver a bebar rápidamente y automaticamente para mantener al líquido en el menor nivel posible.

Apêndice 35

Eager Beaver

rough-terrain fork lift tractor

The Eager Beaver fork lift tractor was specifically designed for the handling of military loads in difficult terrain, including soft sand, deep mud and all uneven surfaces. Air-portability was an important design parameter, resulting in the low profile and light weight of the unit without sacrifice in load-carrying capacity.

To cope with rough conditions, the 78 hp Perkins engine delivers power to all four wheels, each equipped with a high-flotation 11 × 20 Michelin XL tyre with aggressive cross-country tread. Air-dropped pallets previously written off can now be recovered with ease as a routine operation.

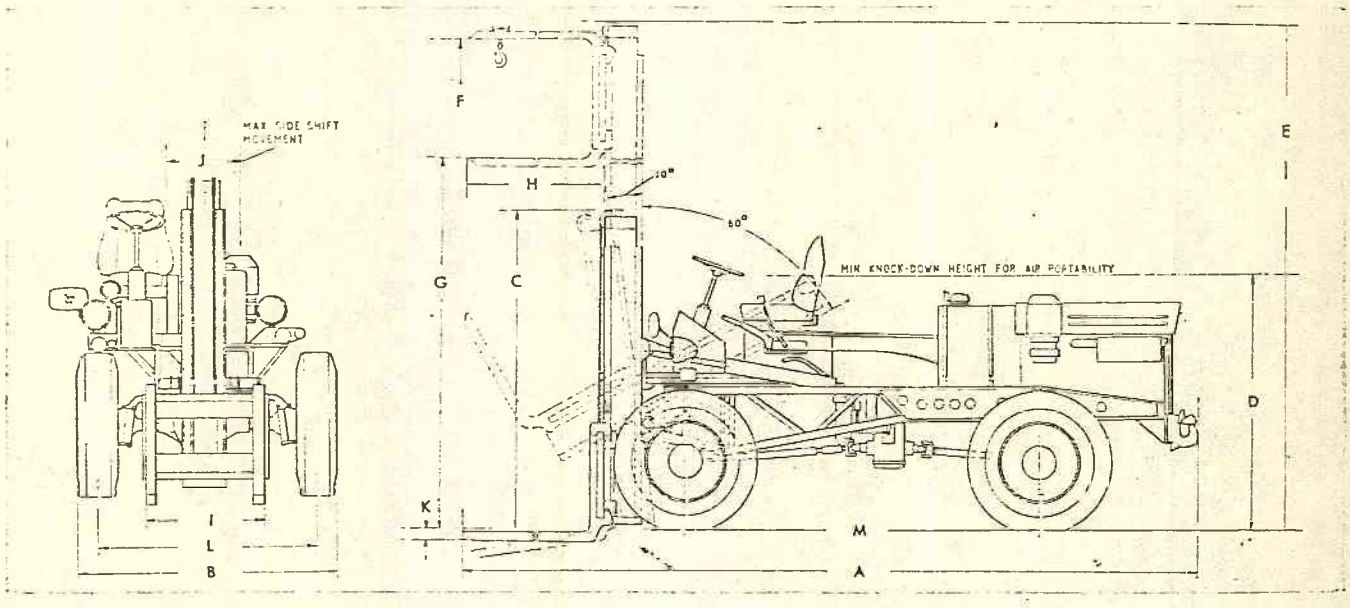
The truck has outstanding handling performance ensured by major advances in fork lift truck design. The combination of the single-beam mast and the driver's seat located to one side of the vehicle gives the operator a full view of the load and forks.

Despite its load capacity of 1820 kg (4000 lb), the truck weighs only 2860 kg (6300 lb) and has a low overall profile.

The vehicle's low total weight and powerful engine give excellent acceleration and a top speed of over 64 km/h (40 mph). It will be a pace-setter in the convoy and allows a rapid switch of handling resources.

To simplify distribution problems at the airhead, Eager Beaver can pull the 5-ton air-portable cargo trailer (ACT 5) singly or in a pair. An aircraft can now be swiftly unloaded on to the trailers, leaving it free to depart while the loaded trailers are towed to the stores area. The trailer has been designed to be dismantled into a compact package so that it can be carried in the smallest transport aircraft.

A crane attachment is carried on the vehicle as an alternative lifting device. This is illustrated by dimension 'F' and used by reversing the lifting hooks in the fork carriage. The electric/hydraulic system incorporates fail-safe cut-out devices to prevent misuse and damage. In industrial storage areas space is at a premium and the ground is usually paved. Industry-derived fork lift trucks therefore have a short overall length and high weight to balance the load. The same balancing moment can be achieved with a much lower total weight by extending the length.

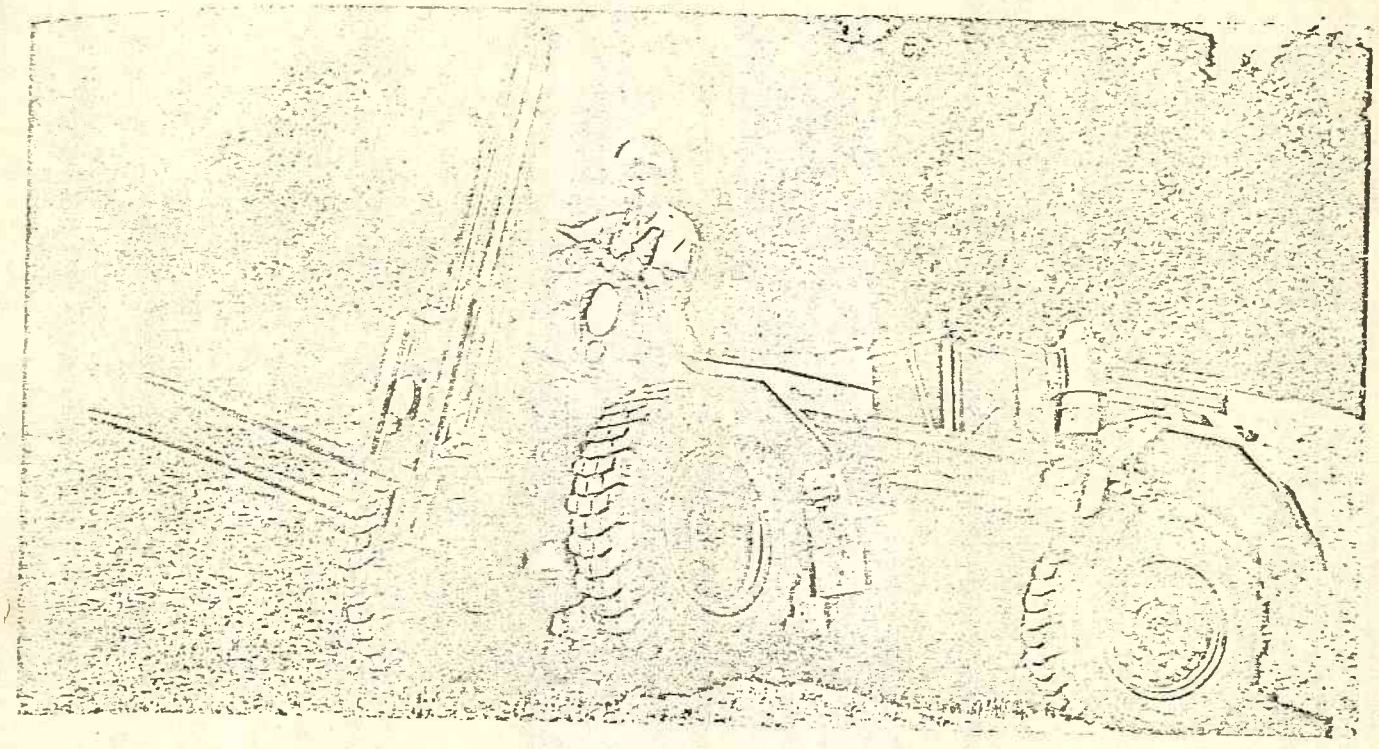


Specification

Engine: Perkins 4·236, four-cylinder diesel
Power output: 78 bhp at 2500 rev/min
Clutch: 330 mm (13 in) Borg & Beck dry clutch
Gearbox: Bedford RL, 4 forward, 1 reverse speed
Aux gearbox: British Leyland combined speed-change and 2/4-wheel drive
Axles: Bedford RL steer-drive, front and rear
Tyres: Michelin XL 11·00 × 20, inflated to 1·75 kg/cm² (25 lb/in²) front, 1·05 kg/cm² (15 lb/in²) rear
Brakes: four-wheel hydraulic main brakes, mechanical transmission disc parking brake
Steering: hydraulic power-steering on 2 or 4 wheels with Orbitrol control valve
Electrical system: 24 V negative earth, two batteries 12 V, 100 Ah each, 15 A alternator, electric starter, all lamps
Hydraulics: gear-driven gear pump delivering 82 litres/min (18 gal/min) at 7124 kgf/cm² (2500 lbf/in²) and 16 litres/min (3·5 gal/min) at 3700 kgf/cm² (1300 lbf/in²), preferentially to steering
Weight, unladen, air-portable: 2560 kg (6083 lb), of which 1230 kg (2709 lb) on front axle and 1330 kg (3374 lb) on rear axle
Chassis: lightweight space frame fabricated in high-tensile steel rectangular tube to British Standard 4360:1968
Seat: waterproof, padded, fully adjustable
Equipment: single-piece forged steel forks and fork extensions, approved type of spark arrester/silencer, windscreen, tool box, camouflage net, inter-vehicle starting equipment

Dimensions
A—Overall length: 5500 mm (213·75 in)
B—Overall width: 1854 mm (73 in)
C—Overall operational height: 2388 mm (94 in), forks lowered, mast vertica
D—Overall air-portable height: 1829 mm (72 in), mast folded back
E—Max height: 3708 mm (146 in), mast fully raised
F—Height to hook: 3250 mm (128 in), with forks inverted
G—Max lift of forks: 2737 mm (107·75 in)
H—Effective length of forks: 1120 mm (44·125 in)
I—Spread of forks: 787 mm (31 in) max; 533 mm (21 in) min
J—Side shift of forks: 152 mm (6 in)
K—Fork section: 82 × 70 mm (3·25 × 2·75 in)
L—Track, front and rear: 1550 mm (61 in)
M—Wheelbase: 2540 mm (100 in)
Turning circle: two-wheel steering 15·17 m (47 ft 10 in); four-wheel steering 9·19 m (30 ft 2 in)
Load centre: 610 mm (24 in)
Mast tilt: forward 13°, backward 20° operational, 60° for air-portability

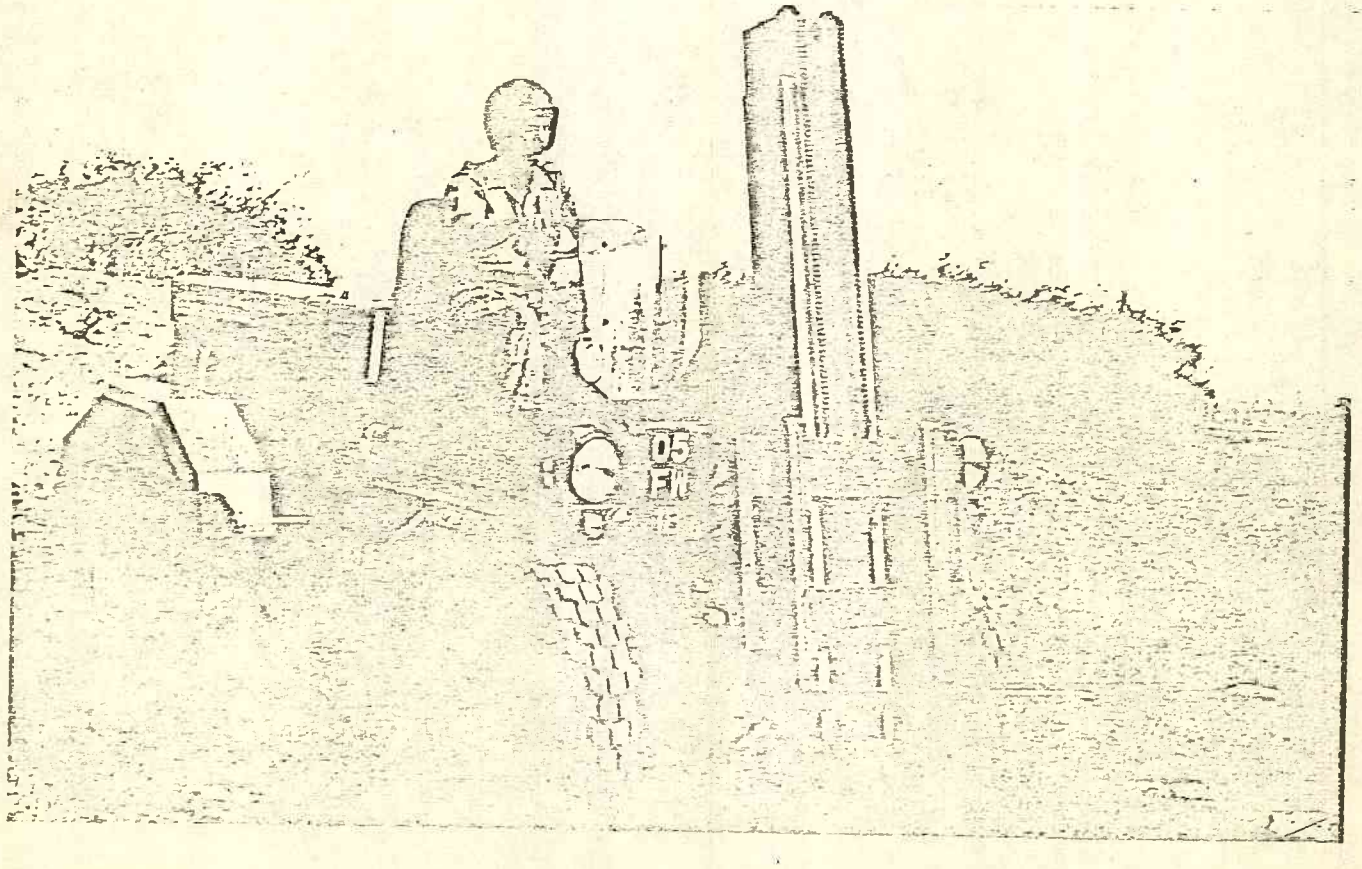
Performance
Load capacity: 1814 kg (4000 lb)
Laden lift speed: 24·38 m/min (90 ft/min)
Speeds: forward 64 km/h (40 mph) on road, up to 24 km/h (15 mph) on rough terrain, reverse 11 km/h (6·7 mph)
Gradability laden: 1 in 2·5



In the open terrain in which field equipment operates space is usually plentiful whereas mobility depends on low specific weight. The Eager Beaver is the first materials handling vehicle to be designed with this basic fact in mind. The Eager Beaver fork lift tractor is a significant contribution to airborne operations and to logistic practice in general.

The illustrations show the simple fabricated chassis, high ground clearance, excellent access to engine and lifting mechanism and the simple arrangement of the four-wheel drive and steering mechanism.

The offset single-beam mast and offset driving seat not only afford an unobstructed view of load and road to the driver, but allow the mast to be folded back for air transportation or high-speed travel on roads.



ROYAL ORDNANCE FACTORIES
Ministry of Defence—Defence Sales Organisation
Stuart House, 23-25 Soho Square, London, Great Britain W1V 5FH

TRADUCCION - APENDICE

Tractor para terrenos escabrosos con elevador a horquilla

Este tractor se diseñó para el manejo de cargas militares en terrenos dificiles, incluyendo arenas blandas y barro profundo. Es aerotransportable. Este fue un factor fundamental del diseño (Bajo perfil y peso liviano, sin sacrificar capacidad de carga)

El motor Perkins de 78 Hp proporciona potencia a las 4 ruedas, equipadas c/u con un neumático de flotación de 11 x 20 Michelin XL.

La combinación del mástil de viga simple y el asiento del conductor localizado a un lado del vehículo, da al operador un amplio panorama de la carga y las cuchillas.

Aparte de su capacidad de carga de 1820 Kg. (4.000 Lb.), el camión pesa solo 2860 Kg. (6.300 Lb.)

El poco peso total del vehículo y su potente motor dan una excelente aceleración y una velocidad tope de más de 64 Km./h.

Para simplificar los problemas de distribución en la cabeza neumática el Beaver Eeager puede empujar el trailer de carga portable de 5 toneladas (ACT 5) simple o en un par. El trailer fue diseñado para ser desmantelado en un embalaje compacto de tal forma que pueda ser llevado hasta en el más pequeño avión de carga. El sistema eléctrico/hidráulico incorpora dispositivos de seguridad para prevenir el desuso y el daño.

En terrenos abiertos en donde opera el equipamiento de campo, generalmente el espacio es abundante considerando que la movilidad depende del bajo peso específico. El Eeager Beaver es el primer vehículo de manejo de materiales que se diseña con este fin básico.

Las ilustraciones muestran el chasis simple fabricado, la alta claridad respecto al suelo, el acceso excelente al motor y el mecanismo de elevación.

El mástil de viga simple y el asiente comando no sólo permite una vista excelente de la carga y el camino del conductor, sino que tambien permite el mástil ser plegado hacia atrás, 60°, disminuyendo aún más su altura.

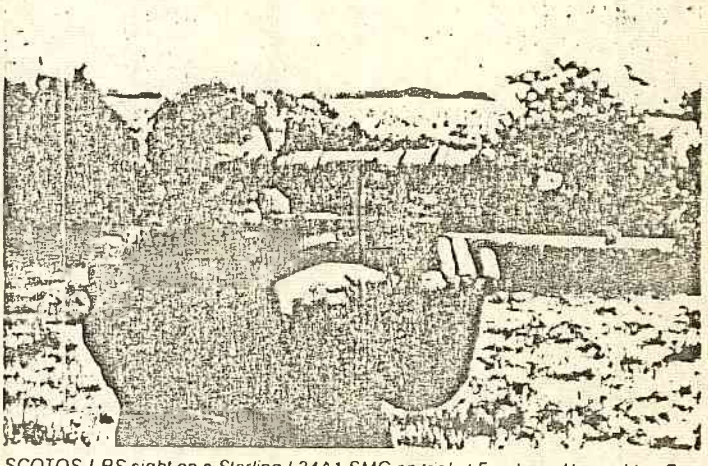
SCOTOS-I-RS INFANTRY WEAPON SIGHT

This light weapon sight has been designed for use with NATO individual infantry weapons and is also suitable for use with many others. The sight uses a relatively low magnification to compensate for tunnel effect and its image intensifier has automatic brightness control: it is thus simple to use.

Mounts are currently available for a variety of weapons and each is arranged so that all necessary zeroing adjustments are incorporated in the mount and none in the sight itself: a single sight (the expensive part) can thus be transferred from one weapon to another and, if the zeroing adjustments have been made previously, be immediately ready for use.

DATA
Dimensions: 380mm × 62.5mm diameter
Weight: 1.65kg
Magnification: × 1.4
Field of view: 240 mils
Power supply: 2 × 2.8V mercury cells with average 200h intermittent operational use

Manufacturer: Aspheronics Inc, Fort Evans Road, PO Drawer 1134, Leesburg, Virginia 22075
Status: Current. In production
Service: Sales to Chile, Iran, Republic of Korea, Lebanon, Nepal, UK and USA



SCOTOS-I-RS sight on a Sterling L34A1 SMG on trial at Fareham, Hampshire, England

Spend 37

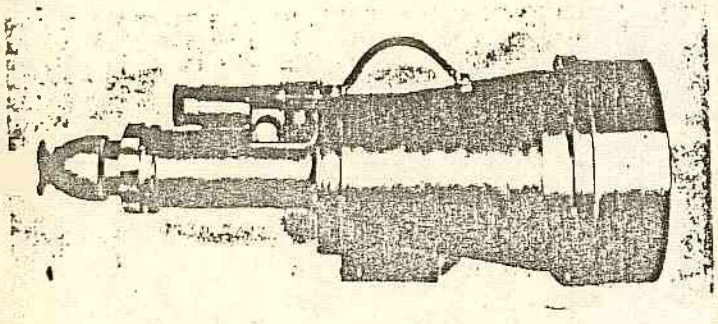
NIGHT VIEWING DEVICE TYPE SS32 (TWIGGY)

Developed on a UK government contract placed in 1969 the 'Twiggy' passive night observation device is in service with UK forces in both surveillance and fire control (artillery and mortar) roles. It has a sophisticated lens system and a three-stage image intensifier powered by a b ry.

optional extras, a laser target marker or thermal pointer and laser rangefinder can be attached.

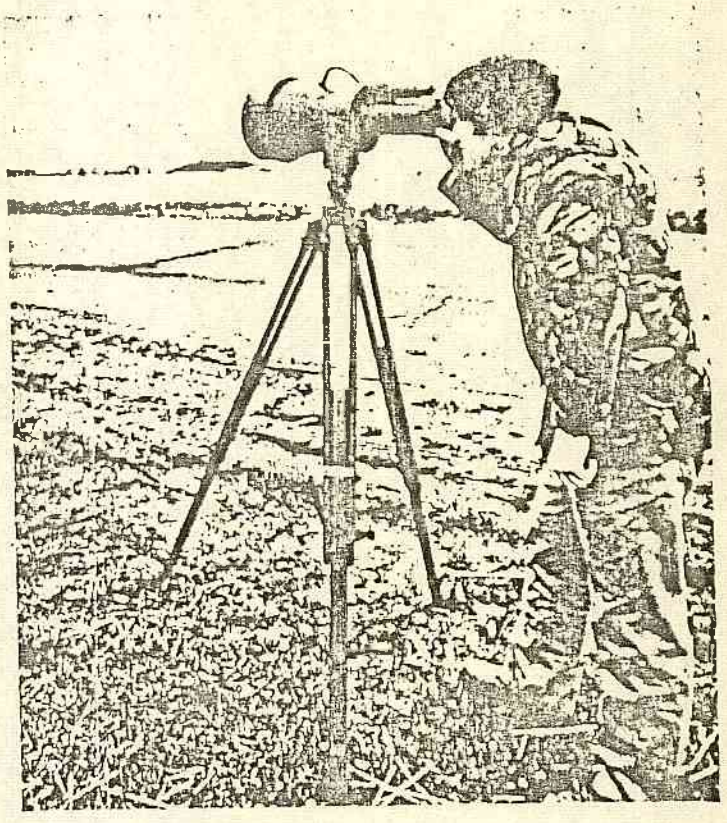
The unusual name of this device was derived from the fact that the viewer was much reduced in overall size and diameter from those that were current at the time. There was a well-known British model by the name of Twiggy who reached a peak of fame at the time the viewer was launched, and her most noticeable characteristic was that she was remarkably thin. To emphasis the small size of the viewer it was christened with her name.

DATA
Dimensions: 610 × 230mm max diameter
Weight: 10kg
Magnification: ×5
Field of view: 129 mils (7.5°)
Objective field: 20m to infinity
Power supply: 6.75V mercury cell (100h) or rechargeable nickel-cadmium cell



SS32 (Twiggy) dismounted

Manufacturer: Rank Pullin Controls, Langston Road, Debden, Loughton, Essex
Status: Current
Service: British Army



SS32 night viewing device

Apendice 38

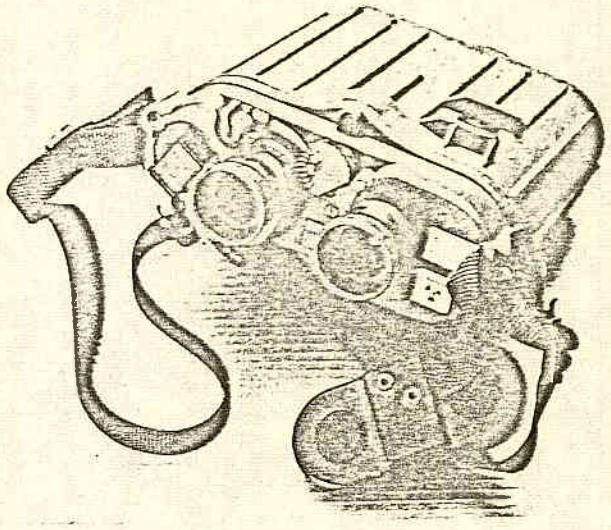
LASERGAGE LP7 RANGEFINDER

The Lasergage firm started operations in the United Kingdom by licensing production of one of the SIMRAD rangefinders. They have now incorporated modifications of their own which are being marketed under their own name.

The Lasergage rangefinders are primarily for infantry use and are intended for the mortar and anti-tank crews for whom range is vital, but there are obvious uses in all aspects of infantry warfare for a light and accurate device of this kind. It is a light and robust instrument, designed in a modular concept so that repair and maintenance are both easy and quick. It operates from a re-chargeable battery which is housed inside the waterproof case. The housing is strong and the entire instrument is resistant to shocks and temperature extremes.

To operate, the aiming telescope is sighted on to the target and the firing button depressed. Immediately the range to that object is displayed in the left eyepiece. The natural response of the eyes is to superimpose this range display onto the picture of the target so that it appears to be viewed by both eyes together. The intensity of the display can be adjusted to suit the background illumination. After 3 seconds the display is automatically switched off to preserve battery power.

There are in addition four indicator lamps which light up to give the following information when appropriate; more than one target in the beam; one or more targets have been gated out by the minimum range control; laser output is low; battery needs recharging.



Lasergage LP7 rangefinder

DATA

Dimensions: 200 × 200 × 90mm
Weight: 2.2kg
Operating temperature: −30 to +55°C

Transmitter

Laser: Nd: YAG
Wavelength: 1,064 μm
Output energy: 4mJ nominal
Pulse width: 10ns nominal
Pulses per minute: 12 (30 intermittent)
Beam width: 1.5mrad

Telescope

Magnification: × 7
Field of view: 120mils nominal
Aperture: 45mm
Eye protection: Dichroic beamsplitter and absorption glass in eyepiece

Receiver

Field of view: 1.3mrad nominal
Type of detector: Avalanche photodiode
Aperture: 45mm
Clock frequency: 29.97MHz
Range accuracy: ± 5m
Type of display: LED, observed through left eyepiece
Minimum range setting: 150-4,000m continuously

Power supply

Built-in battery: NiCd-battery 12V/0.4Ah rechargeable in 4h
Number of shots per battery before recharging: Approx 600 at − 25°C

Manufacturer: Lasergage Ltd, Lennig House, Masons Avenue, Croydon, Surrey
Status: Current. In production
Service: British Army, Argentina, Oman

Apendice 39

Centaur

multi-role military vehicle

Centaur is a new range of half-tracked multi-role military vehicles of outstanding potential in both fighting and support roles. Extreme mobility on almost any terrain, road speeds of 80 km/h (50 mph) and a choice of armour, weapon systems, bodies, equipment fits, cargo and personnel up to a total of 6350 kg (6·25 tons) result in a versatility unequalled by any other current vehicle design.

The Centaur range is the result of intensive engineering development by Laird (Anglesey) Limited, combining the combat-proven Land Rover vehicle and the track designed by the British Ministry of Defence for the Scorpion light tank. The resultant half-tracked vehicle offers unique advantages in both performance and cost-effectiveness. In addition, maintenance and spares support can be based on existing arrangements and both maintenance and driver training requirements are minimal.

The Centaur range embraces many variants. Each variant is designed to fulfil a specific operational role and is purpose-built to meet a wide range of climatic and terrain conditions. Some typical examples are shown. Armour, weapons systems and equipment fits may be varied from those shown to suit individual requirements. Details of other variants are available, and special variants can be designed and built to meet specific needs.

The Centaur concept

The underlying concept of the Centaur range is to combine the road performance and ease of operation of a well-tried wheeled vehicle with the excellent traction, off-road capability and high load-carrying capacity of a tracked vehicle. The resultant high road speed and accurate steering allow the half-tracked Centaur variants to be deployed with standard road vehicles, while their cross-country ability enables them to be used with equal facility in company with fully-tracked fighting vehicles.

The half-tracked concept has been battle-proved in many parts of the world and is recognised as the most adaptable form of fighting and logistic vehicle.

Design

The Centaur range is powered by the Rover 3·5 litre V8 petrol engine which drives both the front wheels and the track through a manually operated gearbox. The vehicle has eight forward and two reverse speeds which are provided by a high-and low-ratio transfer facility in the four-speed gearbox. Simultaneous track and front-wheel drive is arranged through a differential unit built into the gearbox which transmits equal power to the track and the wheels. This differential can be locked when required.

The track is of British Ministry of Defence design, as used on the Scorpion range of light tanks; it incorporates rubber road pads and maintenance-free track link joints. The track road wheels and sprocket wheels are rubber-tyred to provide fast, quiet running.

A wide range of bodies, both armoured and unarmoured, may be fitted to the chassis to suit any particular requirement. In the armoured role, engine compartment and driving cab can be armour-plated to the same standard of protection as the body.

Maintenance and training

The Centaur range of vehicles has been designed to minimise maintenance, servicing for the vehicle being no more than that which is usually associated with a standard Land Rover vehicle. All routine maintenance points are easily accessible and major items such as engine and gearbox can be readily removed and quickly replaced in the event of major overhaul. The training requirement for the maintenance and overhaul of vehicles is much less than that which is necessary for full-tracked or large-wheeled vehicles and personnel who are already familiar with basic vehicle mechanics will be able to undertake the full maintenance routine of the Centaur range without any extensive training.

As the driving controls for all vehicles are identical to those on a standard Land Rover there is virtually no requirement to re-train drivers. All that may be necessary is a short familiarisation period to exercise drivers in the improved mobility and load capability of the vehicle.

Status

A number of pre-production Centaurs were manufactured in 1978, when the vehicles underwent evaluation trials in the United Kingdom, Africa, and the Middle East. The British Army received vehicles in September 1978.

Full production facilities were established at the end of 1978 and production began in January 1979.

Specification

Power unit

Type: Eight-cylinder 90°V petrol engine
Displacement: 3·5 litre (215 in³)
Gross power: 105 kW (136 bhp) at 5000 rev/min
Net torque: 256 Nm (185 lbf/ft) at 2500 rev/min
Ignition type: Coil 12 V
Fuel pump: Electric
Type of fuel: Low-octane petrol
Fuel capacity: 218 litres (48 gal) depending on variant
Lubrication system: Wet sump with oil cooler

Transmission

Clutch: 266 mm (10·5 in) single dry plate, diaphragm spring
Gearbox: Combined assembly main/transfer gearboxes
Main box: Four-speed synchromesh and reverse
Transfer box: Two-speed
Differentials: Three
Differential lock: Positive lock on inter-axle differential
Maximum overall reduction ratio: 47·8:1 (engine to track)

Steering, brakes and suspension

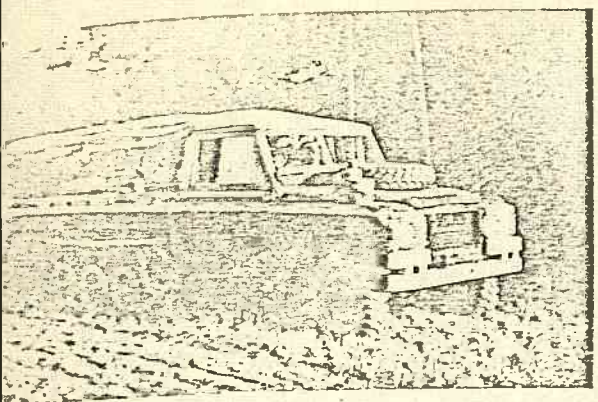
Steering: Burman recirculating ball type
Front brakes: Drum, hydraulic servo-assisted
Rear brakes: Inboard discs, each with twin calipers, servo-assisted
Hand brake: Mechanical, on transmission
Front suspension: Semi-elliptic leaf spring and double-acting hydraulic telescopic dampers
Track suspension: Independent torsion bar on each wheel

Weights (basic variant)

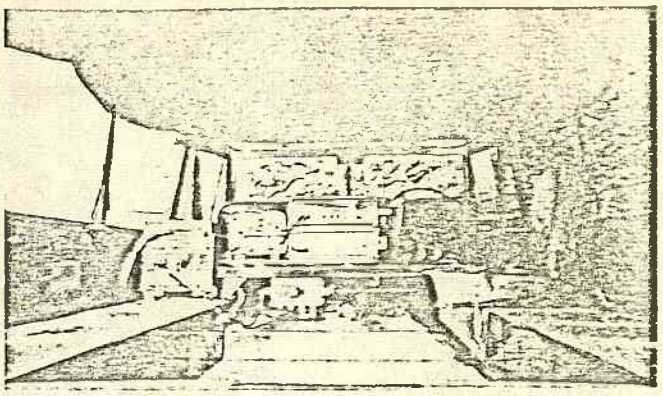
Unladen: 3048 kg (3·0 tons)
Laden: 6350 kg (6·25 tons)

Track (to British Ministry of Defence design and specification)

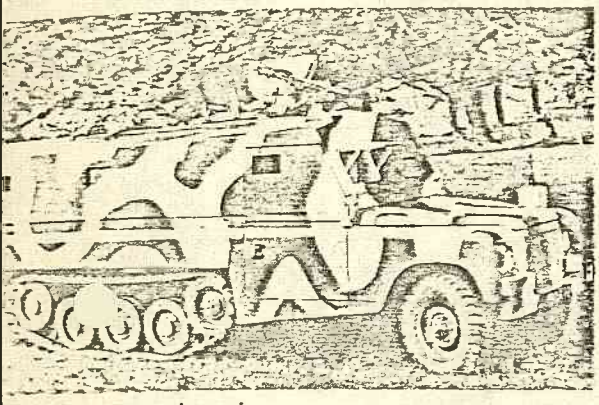
Construction: Light steel with bonded rubber road pads and central horn
Connection: By steel pins in resilient rubber bushes
Tensioning: Hydraulic ram on rear idler wheel
Drive: 14-tooth twin sprockets
Track ground pressure (unladen): 0·25 kgf/cm² (3·49 lbf/in²)



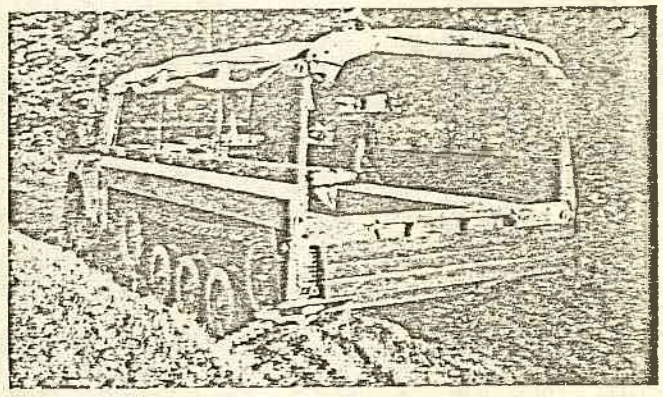
ral-service vehicle



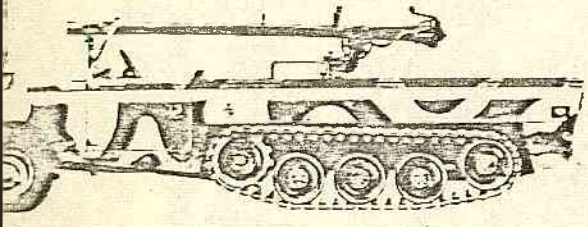
Radio installation in general-service vehicle



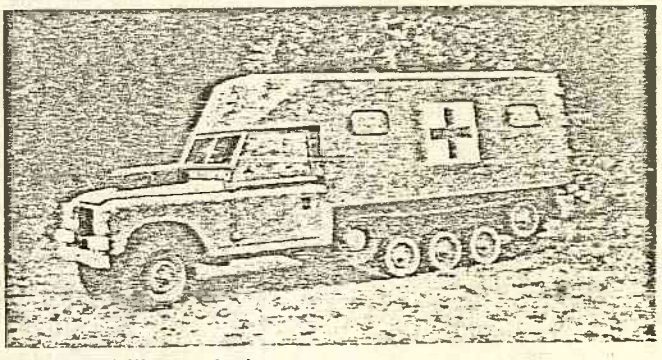
ured personnel carrier



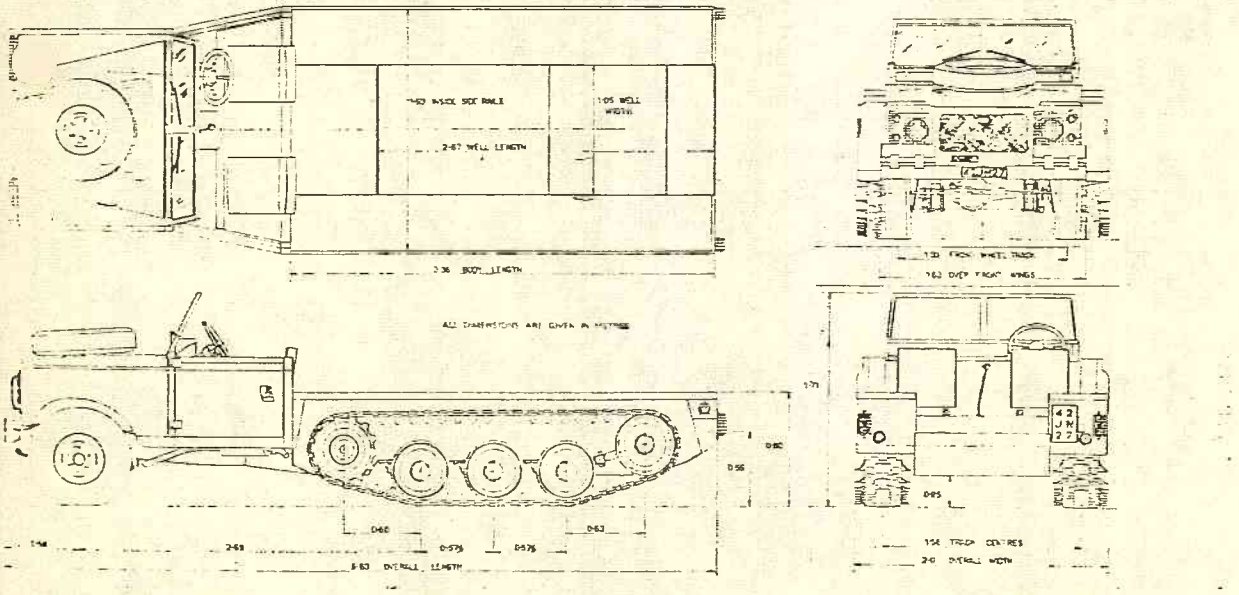
Rear view of general-service vehicle



nm gun platform



High-mobility ambulance



D (ANGLESEY) LIMITED

aris, Gwynedd, Great Britain, LL58 8HY

Beaumaris (0248) 81043↑ Cables: Searoads Beaumaris Telex: 61295

Apendice 40

Scorpion

light tank

The Alvis Scorpion is a fast, light tank with a very effective 76 mm gun firing HE, HESH, canister, smoke and illuminating ammunition. A 7·62 mm machine gun is mounted co-axially, both weapons having 10 deg depression and 35 deg elevation from the horizontal. Two multi-barrel smoke dischargers are also fitted, one on each side of the turret. Scorpion has a battle weight of less than 7940 kg (17 500 lb), which enables two to be carried in a C130 Hercules aircraft for a distance of over 1600 km (1000 miles). Despite its low weight, Scorpion has better protection than any other light vehicle in its class; this is largely due to the use of aluminium alloy armour. Scorpion carries a crew of three, is powered by the Jaguar 4·2-litre engine giving 141·7 kW (190 bhp) and has a maximum road speed of 80·5 km/h (50 mph).

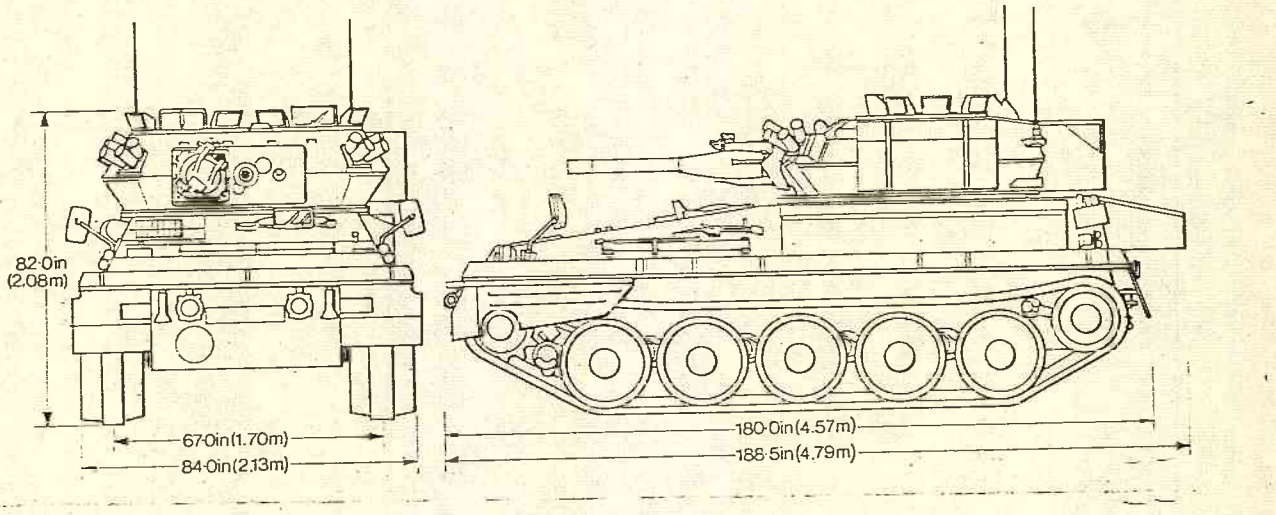
Optional installed equipment comprises power traverse, gunner's sight with laser rangefinder, night fighting equipments, swimming equipments, air circulation equipments, nuclear, biological and chemical (NBC) protection equipments and radio/communications equipments.

Designed to meet a British Army requirement for a fast, highly manoeuvrable combat and reconnaissance vehicle capable of operating by day or night in any terrain under all possible climatic conditions, Scorpion is in service with the British, Belgian and other armies.

Using Scorpion as the basic vehicle and using the same tested and proved automotive components, a whole family has been created. Its members include: Spartan (armoured personnel carrier), Striker (armoured guided weapon carrier), Sultan (armoured command vehicle), Samaritan (armoured ambulance), Samson (armoured recovery vehicle) and Scimitar (armoured 30 mm Rarden gun anti-armoured personnel carrier). These variants are described elsewhere in this catalogue. Other variants are possible; Alvis can field engineers to discuss customers' individual military needs.

Apart from their low initial costs, the Scorpion family offers even more important savings in terms of money and manpower. Because of the extreme versatility of the basic design it is possible to build up armoured fighting units for almost any tactical purpose, complete with all necessary command and support vehicles, with spares and servicing facilities common to all vehicles.

The Scorpion family conforms to the British Ministry of Defence's most stringent quality standards. Alvis has been assessed by the British Ministry of Defence to quality assurance DEF STAN 05-21.



Specification

Protection
Hull of special aluminium alloy to latest techniques and specifications. Heaviest armour over frontal arc. Hull sides, tracks, road wheels and suspension give good side protection. Turret and upper surfaces well sloped.

Armament
Gun: 76 mm, 360° traverse, +35° elevation, −10° depression
Machine gun: for ranging 7·62 mm, parallel with main gun
Smoke dischargers: two multi-barrel, on turret
Ammunition: 40 rounds of 76 mm (HE, HESH smoke canister, illuminating)
3000 rounds of 7·62 mm, 16 smoke grenades

Sights
Commander: binocular, ×10 and ×1
Gunner: monocular, day/night, ×10 and ×1
Driver: wide-field periscope, passive night sight optional

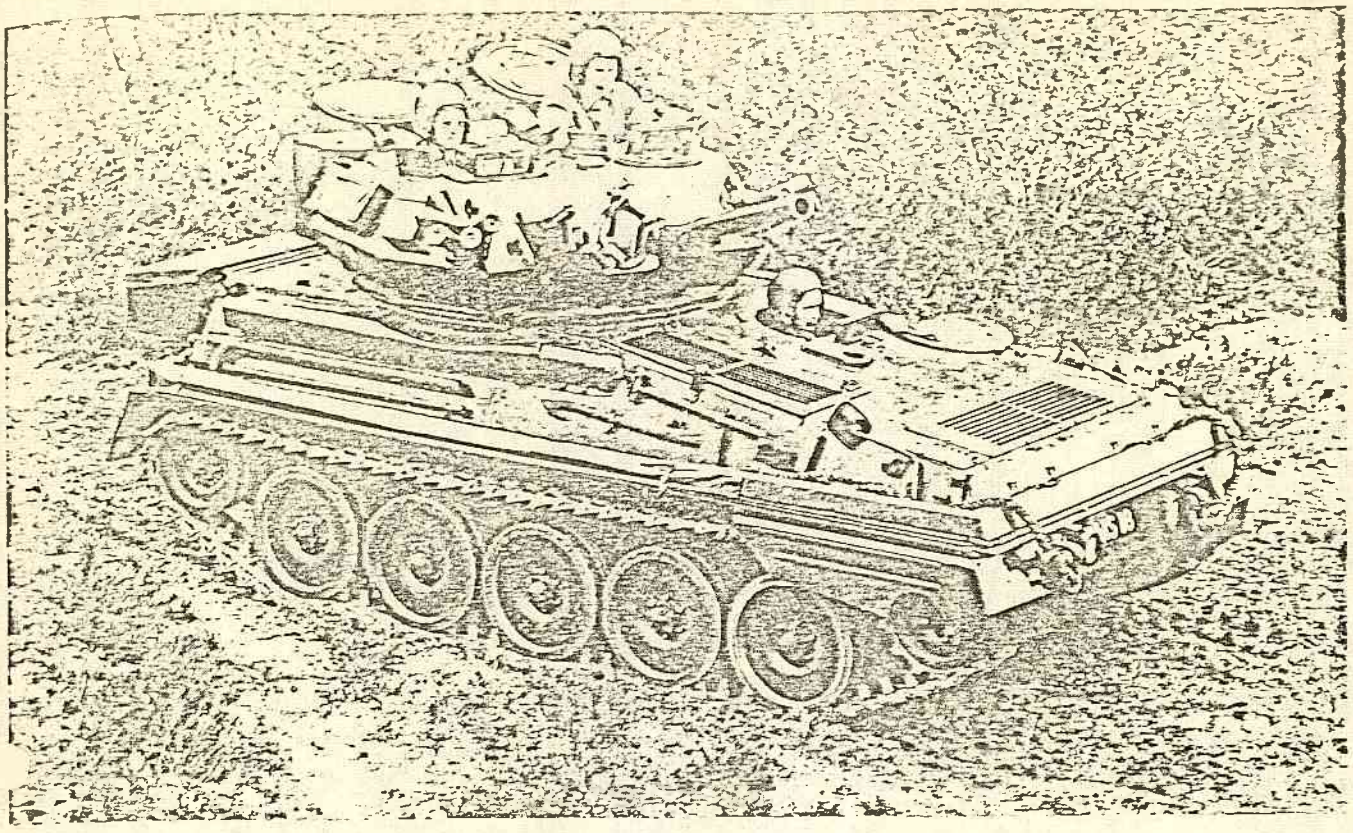
Mobility
Max road speed: 80·5 km/h (50 mph)
Vertical obstacles: 500 mm (19·7 in)
Approach angle: 26°. Departure angle: 21° 31′
Power/weight ratio: 17·85 kW/tonne (24·32 bhp/ton)
Ground pressure: 34·5 kN/m² (5 lbf/in²)
Fording without preparation: 1067 mm (42 in)

Engine
Make: Jaguar J60 petrol six-cylinder 4200 cm³
Maximum hp (gross): 190 bhp at 4750 rev/min. (This is a militarised de-rated version of the unit which powers the Jaguar 4·2 motorcar)

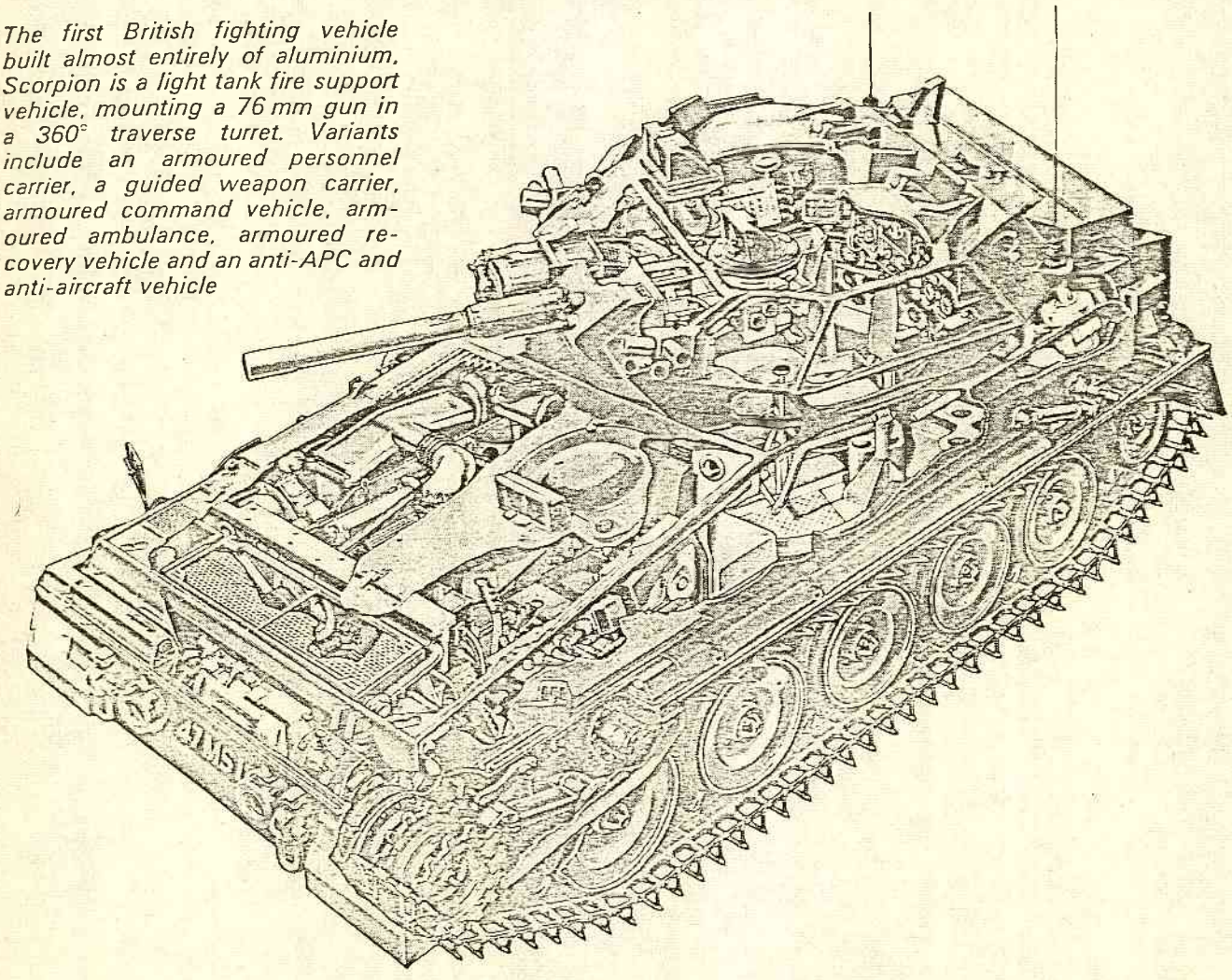
Transmission
Gearbox: semi-automatic hot-shift with 7 speeds forward, 7 speeds reverse
Steering: Merritt system, incorporated in gearbox
Steering brakes: caliper discs, hydraulic operation
Main brakes: caliper discs, hydraulic operation

Suspension
Springs: transverse torsion bar
Road wheels: solid rubber tyres bonded to aluminium alloy wheels
Tracks: light steel, with rubber bushes and pads, 79 links per track
Weight per track: approximately 350 kg (770 lb)

Electrical system
Supply: 24 V negative earth
Batteries: 2 × 2 in series, 100 Ah 12 V each
Generator: 140 A
Radio equipment: to individual specification



The first British fighting vehicle built almost entirely of aluminium, Scorpion is a light tank fire support vehicle, mounting a 76 mm gun in a 360° traverse turret. Variants include an armoured personnel carrier, a guided weapon carrier, armoured command vehicle, armoured ambulance, armoured recovery vehicle and an anti-APC and anti-aircraft vehicle



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Scorpion variants

for diverse operational roles

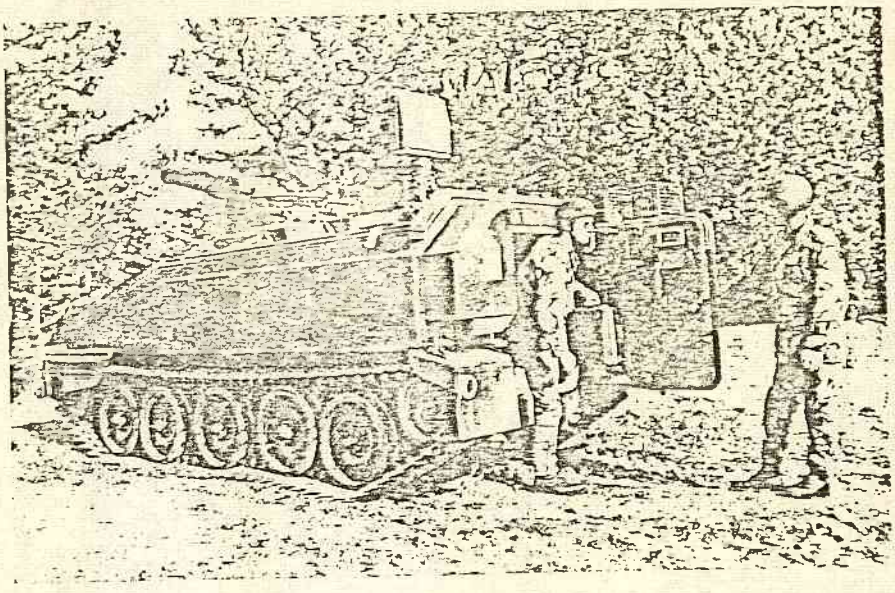
Spartan
armoured personnel carrier

Spartan can accommodate the British assault section of seven men, including driver, gunner, section commander and four men. There is stowage for weapons full equipment and stores such as mines and explosives.

A 7·62 mm machine gun mounted in a cupola permits traverse and elevation, aiming, firing and reloading from under armour. The sight is a periscope monocular, ×1/ ×10 magnification; additional episcopes give the section commander allround vision. There is a built-in night sight. The commander's spotlight is linked to the machine-gun mounting. Further periscopes are in the sides and a vision block in the rear door for the crew.

A ZB298 radar scanner is mounted on the roof, while the display unit and batteries are inside the vehicle. The installation can be used as a man-portable ground surveillance set.

The Spartan armoured personnel carrier provides a highly manoeuvrable vehicle from which the HOT (high-subsonic optically teleguided) long-range anti-tank weapon system can be operated. A combination of these two advanced systems, HOT and Spartan, provides an effective anti-tank weapon which is capable of destroying heavy armour beyond the range of guns and able to survive in the severe environment of battlefields.



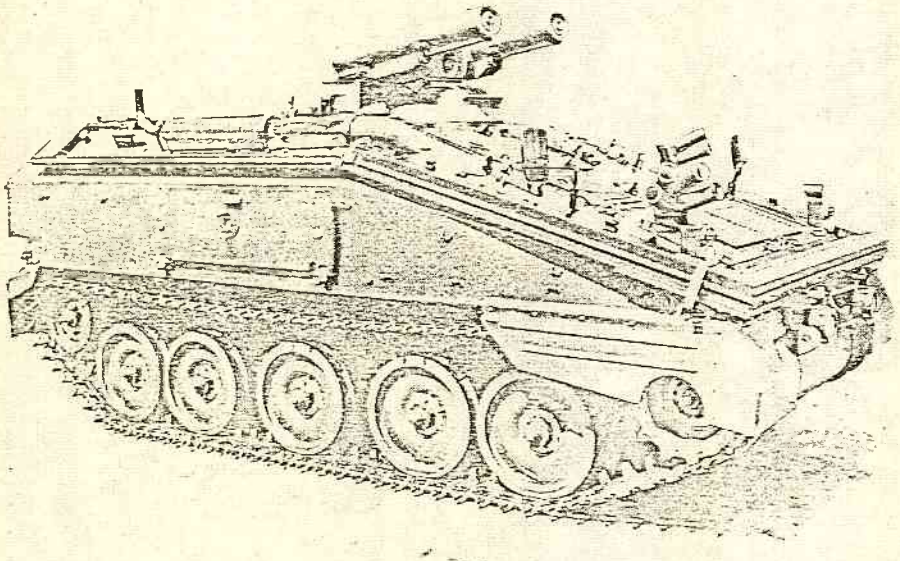
The HOT/Spartan system combines the latest high-technology specifications of front line NATO forces: HOT is in service with the French and West German armed forces and Spartan with the British and Belgian armies.

The HOT on Spartan semi-automatic anti-tank weapon is a further adaptation of the already proven HOT on vehicle and helicopter anti-tank weapon systems which have already entered service with many armed forces throughout the world.

The HOT anti-tank weapon system can be readily installed during the manufacture of Spartan or retrospectively fitted to customers' existing vehicles.

Most of the HOT on Spartan black boxes are standard units which can be readily interchanged with similar helicopter or vehicle electronic assemblies; the missiles themselves are identical for ground and air firings.

Additional vehicles to the Scorpion family are under development. Further particulars are available from Alvis.

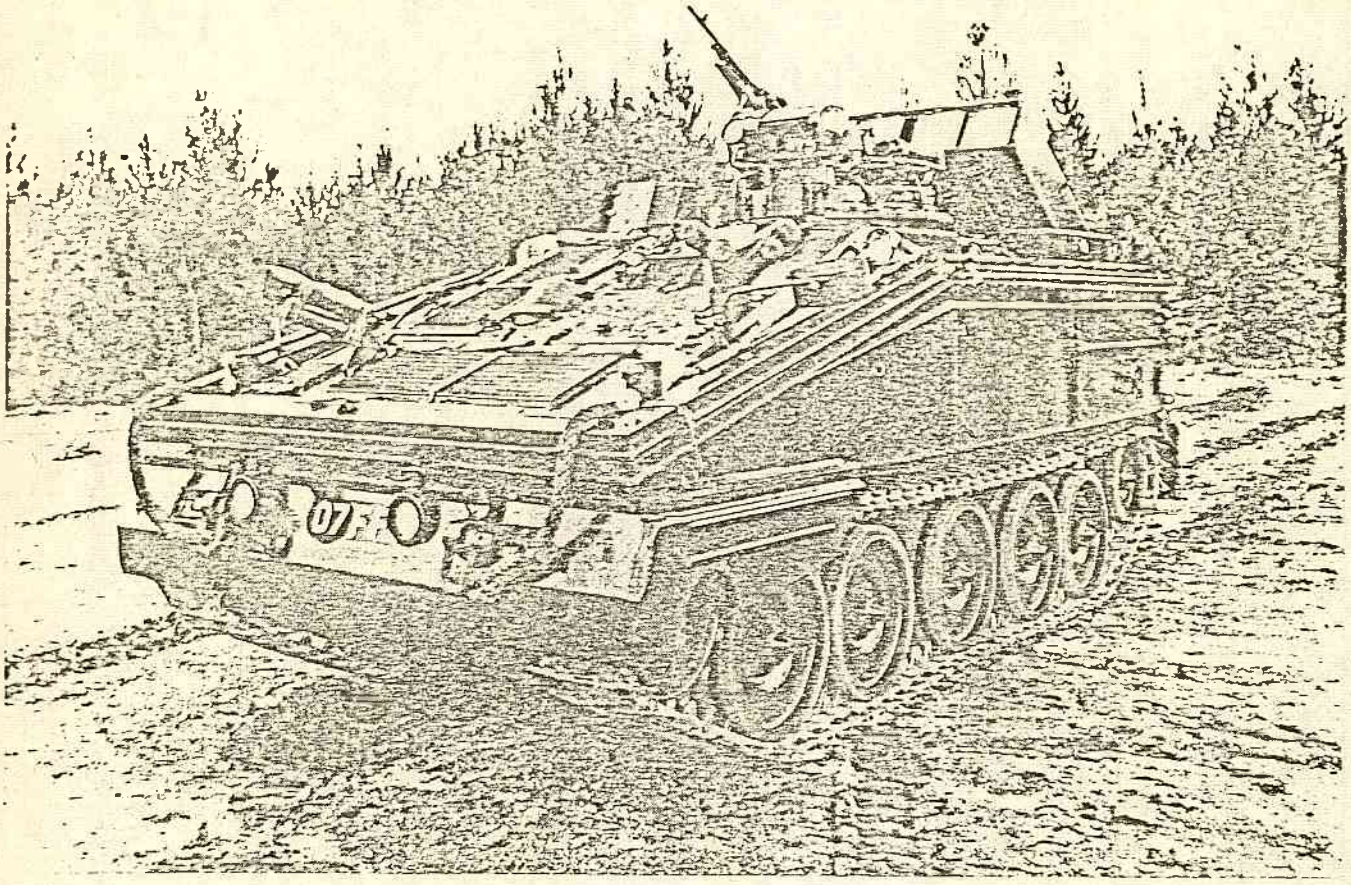


Striker
anti-tank guided weapon vehicle

Striker is designed to provide long-range anti-tank capability. The main components and layout are similar to Scorpion but with a slightly higher hull roof line.

The Swingfire missile system is as used on the current range of British guided weapon vehicles. Five missiles are carried in protected launchers on the rear of the hull.

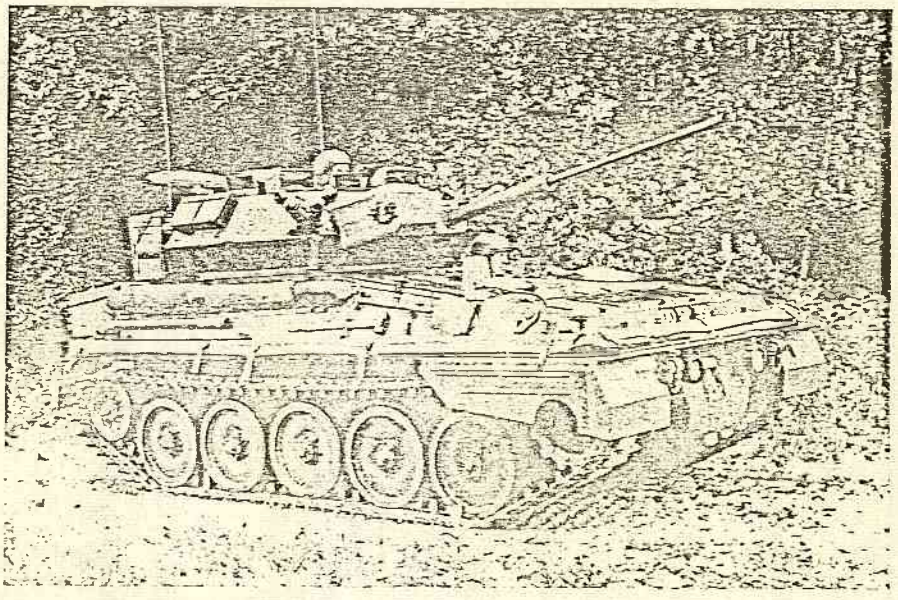
The launchers are elevated by an hydraulic ram for firing. They are re-loaded from outside the vehicle. from the five spare missiles carried under armour in the hull.



Scimitar
Rarden 30 mm gun version

This vehicle uses the basic Scorpion hull and turret but has been modified to mount the Rarden 30 mm gun instead of the 76 mm gun and to carry 165 rounds of 30 mm ammunition. Scimitar is designed to meet a British requirement for worldwide reconnaissance and security roles, with good capability against light armour. Overall weight is about 7500 kg (17 200 lb).

The Rarden, described elsewhere in this Catalogue, provides good anti-armour capability against existing and future enemy light armour and APCs. It can also defeat the sides and rear of heavier tanks. The HE round can deal with unarmoured targets behind light cover and deter low-flying aircraft and helicopters.



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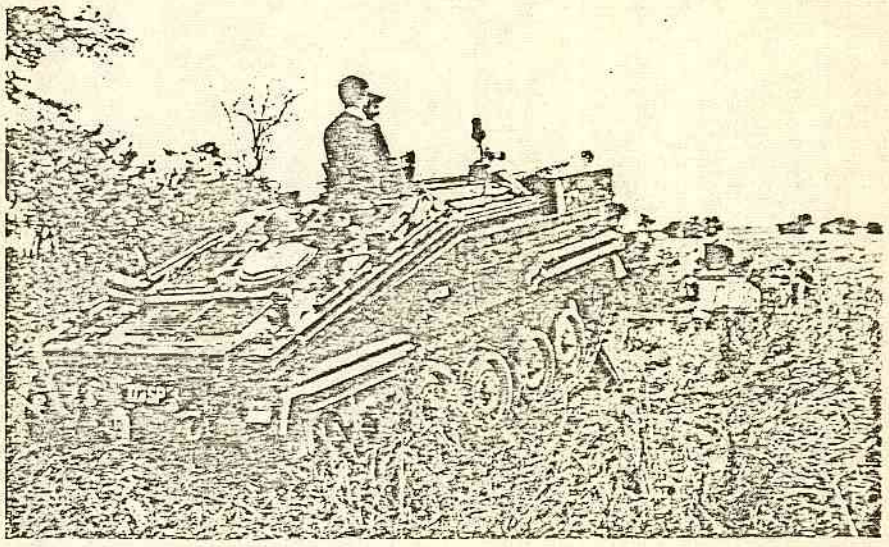
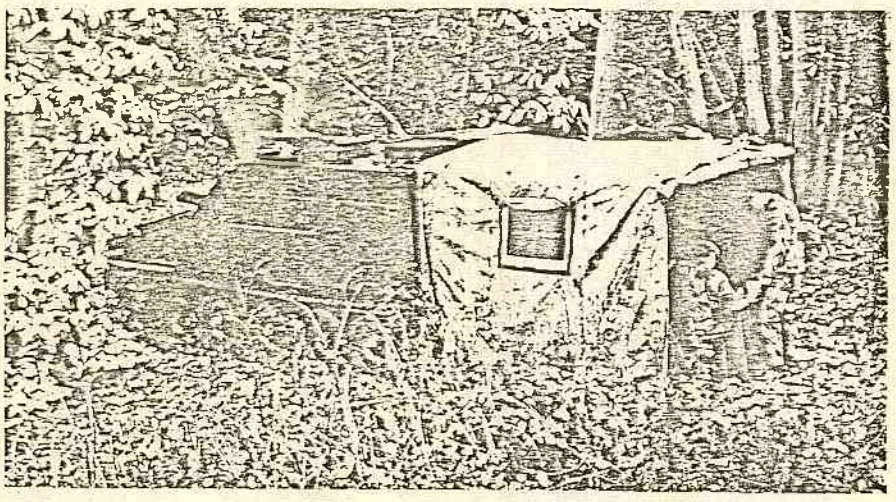
Scorpion variants

for diverse operational roles

Samson
armoured recovery vehicle
The recovery winch fitted inside the hull is driven from the main engine. It has a variable speed of up to 120 m/min (400 ft/min) on the 225 m (750 ft) of wire rope. Maximum pull, with a 4:1 snatch block, is 12 tons, enabling Samson to tow vehicles across a river or to aid at river crossings.

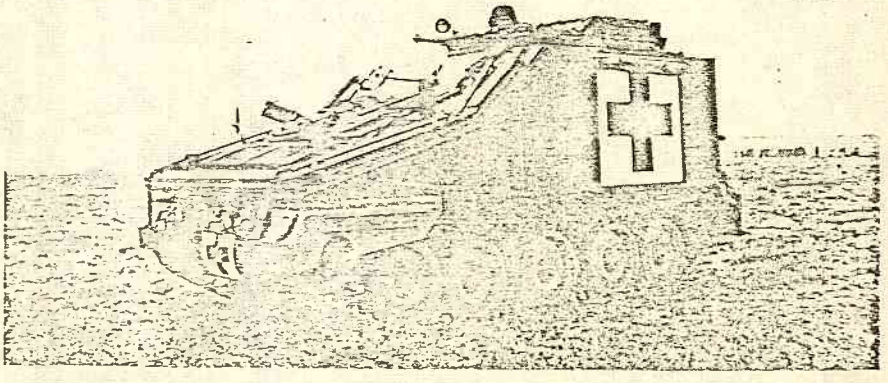
An applique propeller kit which will improve the water performance (giving a water speed of 6 kn or nearly 10 km/h) and manoeuvrability is available as an option for the whole tracked family.





Sultan
armoured command vehicle
A special hull, giving 305 mm (12 in) greater headroom inside than the armoured personnel carrier version, allows greater stowage in the command vehicle. A spacious penthouse is mounted at the rear to give double the accommodation of the hull.

Samaritan
armoured ambulance
Using a hull similar to that of Sultan, the Samaritan armoured ambulance has, in addition to the driver and medical orderly, accommodation for four stretcher cases, or two stretcher cases and three sitting cases, or five sitting cases.



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Apêndice 40

Alvis Scorpion Reconnaissance Vehicle

Development

In the late 1950s the British Army issued a requirement for an Armoured Vehicle Reconnaissance (AVR) to undertake the roles of reconnaissance, fire support and anti-tank. After studying a variety of proposals the Fighting Vehicles Research and Development Establishment (now the Military Vehicles and Engineering Establishment) came to the conclusion that two vehicles would be required to carry out these roles, which became the Combat Vehicle Reconnaissance (Tracked) Scorpion (FV101) and the Combat Vehicle Reconnaissance (Wheeled) Fox (FV721), both of which use the same Jaguar engine.

The Scorpion was preceded by a Test Rig known as the TV 15000, which was made of aluminium armour, powered by a Rolls-Royce B60 petrol engine which developed 130 hp (replaced in 1966 by the more powerful Jaguar XK petrol engine), and had a hydro-pneumatic suspension. The TV 15000 was followed in 1966 by two test rigs, one of which was static and was used to test the cooling system and other components and the second, called the Mobile Test Rig, tested automotive features. The latter did not have the hydro-pneumatic suspension as fitted to the TV 15000 but had a new TN15 transmission which is essentially a scaled-down version of that installed in the Chieftain MBT.

In September 1967 Alvis Limited of Coventry, which was at that time building the FV600 range of 6 × 6 armoured vehicles, was awarded a contract to build 17 prototypes. The first prototype was completed in January 1969 and the first official announcement of the vehicle was made in September the same year. All 17 prototypes were completed by the middle of 1970 and in May 1970 the Scorpion was accepted for service with the British Army. In October 1970 the Belgian Army placed an order for 701 Scorpions, which were assembled at a British Leyland facility at Malines in Belgium. Some of the components of the Belgian vehicles are made in Belgium.

The first production Scorpions were delivered to the British Army in January 1972 with first deliveries being made to the Belgian Army in February 1973.

In July 1977 it was stated that production for both the Belgian and British Armies would be completed by 1980 when the number of vehicles deployed would be over 2000 (including variants). At the same time it was said that export sales had reached 400 vehicles. Since then further export orders for the Scorpion series have been won and it is estimated that at least 3000 vehicles have now been ordered (including those delivered).

It was announced early in 1979 that the Royal Air Force Regiment had ordered more than 130 members of the Scorpion family (including Scorpion, Spartan, Sultan and Samson) for the defence of Royal Air Force airfields in West Germany. These are to be delivered from 1980 to 1982.

Scorpion has been designed to operate in temperatures from −30 to +50°C and a Lockheed C-130 Hercules transport can carry two of them. In the British Army Scorpion is centralised in the division reconnaissance regiments for medium reconnaissance.

Description

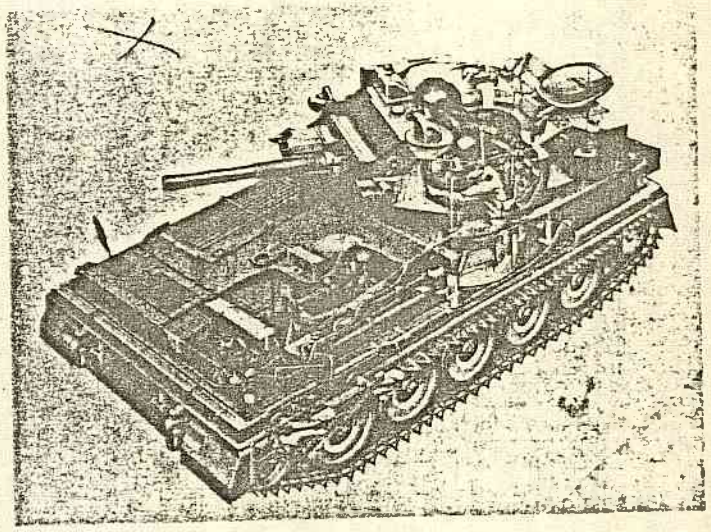
The hull of the Scorpion is made of all-welded Alcan aluminium armour and provides the crew with protection against attack over its frontal area from 14.5 mm projectiles and against 7.62 mm armour-piercing rounds over the remainder of the vehicle. The hull is divided into three compartments: driver's at the front on the left, engine at the front on the right and the fighting compartment at the rear.

The driver has a single-piece hatch cover that swings to the left, in front of which is a single wide-angle periscope which can be replaced by a Pilkington passive periscope for night driving.

The Scorpion is powered by a de-rated (from 265 to 190 bhp) and militarised Jaguar 4.2-litre engine with a Solex carburetter and a compression ratio reduced from 9:1 to 7.75:1, which permits the use of military fuels. The transmission, which is at the front of the vehicle, has been developed on the same principles as that used for the Chieftain MBT. It is a hot-shift, foot-operated, seven-speed gearbox with a controlled differential steering system. For engine cooling a single mixed flow fan draws in air through the radiator over the gearbox, over the engine and out through the louvres.

The other two crew members are seated in the all-welded aluminium armour turret with the commander on the left and the gunner on the right, both with a single-piece hatch cover that opens to the rear. The commander

Scorpion fitted with Solartron Simfire training equipment (Ministry of Defence)



Cutaway drawing of CVR(T) Scorpion

has seven periscopes and a roof-mounted sight in front of his hatch cover with a magnification of × 1 and × 10. The roof-mounted sight is capable of limited rotation allowing approximately an 85-degree horizontal field of view. The gunner has two periscopes and a roof-mounted sight with a magnification of × 1 and × 10. Mounted to the right of the mainarmament is a Rank Precision Industries passive night sight with a magnification of × 5.8 (8-degree field of view) and a low magnification of × 1.6 (28-degree field of view). There can be no confusion between the two as when the high magnification is being used a shutter isolates the low magnification objective. The image intensifier diaphragm isolates the high magnification objective. The image intensifier tube is protected from the effect of gun muzzle flash by a flash shutter that is operated electrically from the gun firing circuit. When high magnification is selected an illuminated ballistic graticule with brightness control is automatically injected into the optical system. The exposed objective window is cleaned by a wiper and washer and the sight is protected by an armoured cover with a door which is kept closed when the sight is not in use. The sight will detect infra-red devices.

The radios are in the turret bustle and a light metal stowage box is mounted externally at the rear of the hull. British Army Scorpions now have a stowage box at the rear of the hull and all vehicles now have a stowage box on the left side of the hull.

The torsion bar suspension consists of five rubber-tyred aluminium road wheels with the drive sprocket at the front and the idler at the rear. There are no track return rollers. Hydraulic lever type shock absorbers are provided for the first and last road wheel stations either side. The tracks are of light steel with rubber bushes and pads, and have a life of over 5000 km of mixed road and cross-country running.

British Army Scorpions have an NBC system at the rear of the hull, but if it is not installed an additional 20 rounds of 76 mm ammunition can be carried. Optional equipment includes an NBC detector kit, vehicle navigation system and a Normalair-Garret air-conditioning system which has already been fitted on the vehicles supplied to the United Arab Emirates.

The Scorpion can ford to a depth of 1.067 metres without preparation. A flotation screen carried collapsed around the top of the hull can be erected by the crew in five minutes and the vehicle is then propelled and steered across the stream or river by its tracks at a speed of 6.44 km/h. A propeller kit has also been developed and when fitted with it the Scorpion has a maximum water speed of 9.65 km/h.

The Scorpion is armed with a 76 mm L23 gun which is a lighter version of the L5 used in the Saladin armoured car. This weapon has a vertical sliding breech and is loaded with fixed ammunition. It has a recoil of approximately 280 mm and is returned to the firing position by a hydro-pneumatic recuperator. During runout the breech is opened by a semi-automatic cam, the empty cartridge case is ejected and the breech then remains open ready for reloading. The gun has an elevation of +35 degrees and a depression of −10 degrees, turret traverse being 360 degrees. Elevation and traverse are both manual but if required the vehicle can be delivered with powered traverse. The following types of ammunition can be fired:

A 7.62 mm machine gun mounted coaxially to the left of the main armament can be used as a ranging machine gun. Mounted either side of the turret is a four-barrelled electrically-operated smoke discharger.

Scorpion with Cockerill Gun

For trials purposes a Belgian Scorpion has been fitted with a Belgian Cockerill 90 mm gun which fires the following types of fixed ammunition: HEAT-T, HESH-T, HE-T, Smoke-WP-T and Canister. Full details are given in the *Ammunition* section under Belgium.

Scorpion with Laser Rangefinder

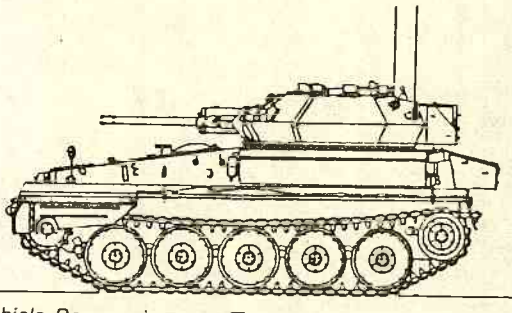
It is expected that as part of the planned mid-life improvement of the Scorpion the vehicle will be fitted with a laser rangefinder. At least three British companies, Avimo, Barr and Stroud and Rank Pullin Controls, have already developed laser rangefinders for the Scorpion. The Avimo model is called the LV10 and is an Integrated laser range-finder/gunner's sight which can be fitted into the Scorpion without modification to the vehicle. Barr and Stroud have developed the LF11 laser rangefinder which has already been adopted by two countries for installation in the Scorpion and is suitable for installation in other AFVs such as the Vickers MBT. Rank Pullin Controls have developed the SS125/126 Argus day/night sight which can be installed at either the commander's or gunner's position and can be fitted with a laser rangefinder if required.

Scorpion with Swingfire ATGWs

British Aerospace Dynamics Group have proposed that a Swingfire ATGW could be mounted either side of the turret to give the vehicle a long-range anti-tank capability.

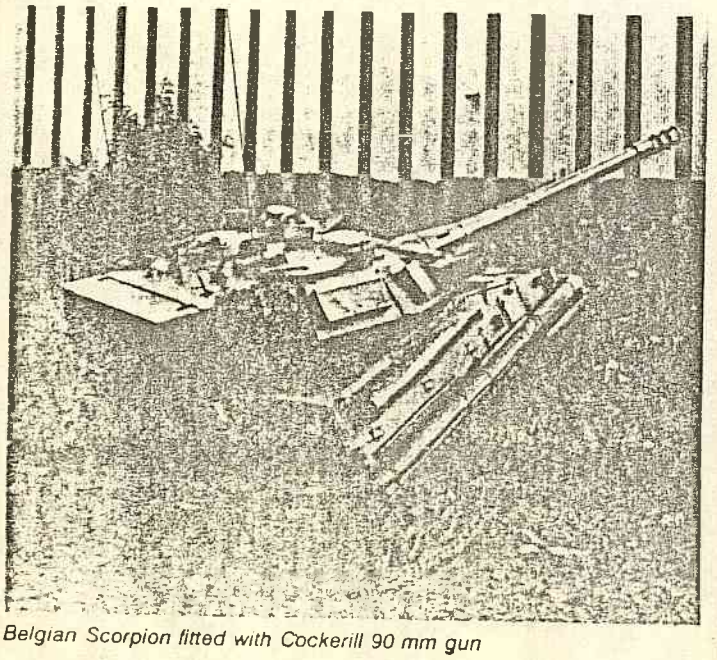
Striker Anti-tank Guided Weapon Vehicle (FV102)

The first production Striker was delivered to the British Army in June 1975 and it entered service with the BAOR in 1976. It is issued to the anti-tank regiments of the Royal Artillery. First deliveries to the Belgian Army were made in June 1976.

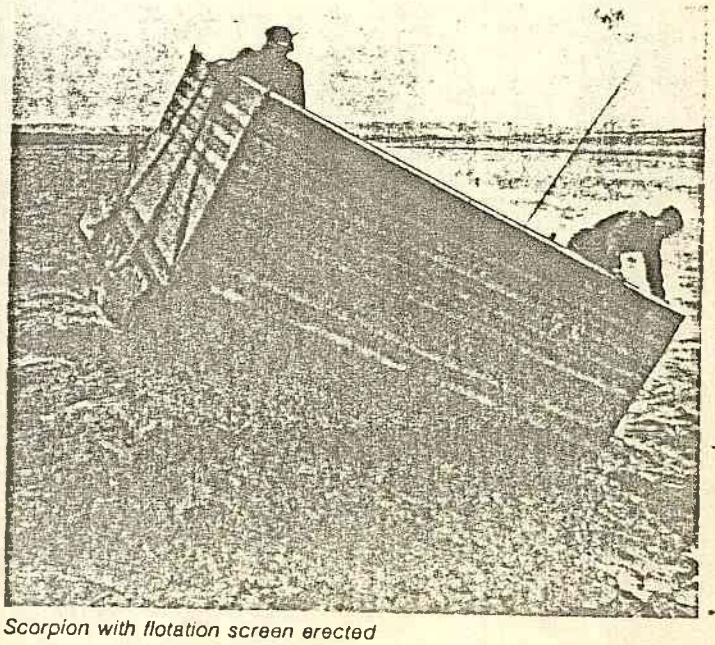


Combat Vehicle Reconnaissance (Tracked) Scorpion (FV101)

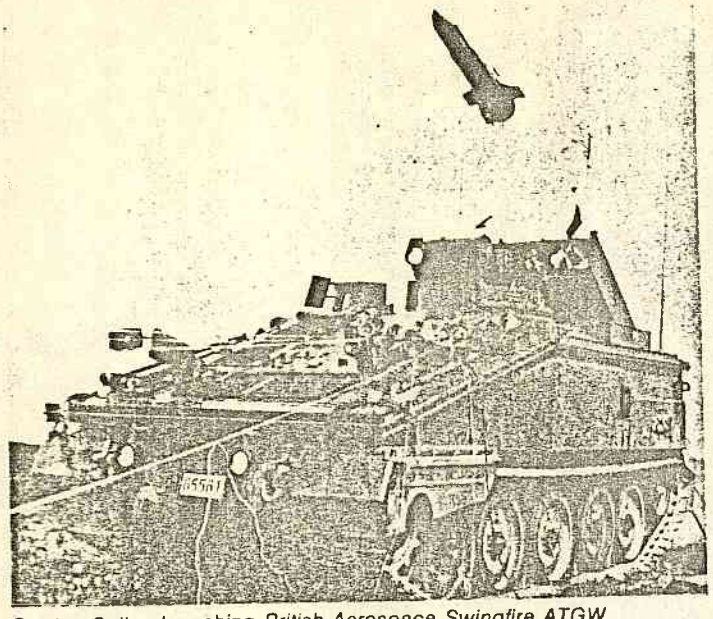
Type	HESH	SH/PRAC	HE	HE/PRAC	SMK/BE	CAN	ILL
Designation	L29A3	L40A1	L24A4	L25A4	L32A5	L33A1	L42A1
Weight of complete round	7.40 kg	7.41 kg	7.33 kg	7.38 kg	10.2 kg	6.76 kg	10.31 kg
Weight of projectile	5.39 kg	5.39 kg	5.36 kg	5.24 kg	8.51 kg	n/app	7.09 kg
Max range direct	2200 m	2200 m	2200 m	2200 m	n/app	150 m	n/app
Max range indirect	5000 m	5000 m	5000 m	5000 m	3700 m	290 m	n/app
Muzzle velocity	533 m/s	533 m/s	514 m/s	514 m/s	n/app	290 m/s	n/app



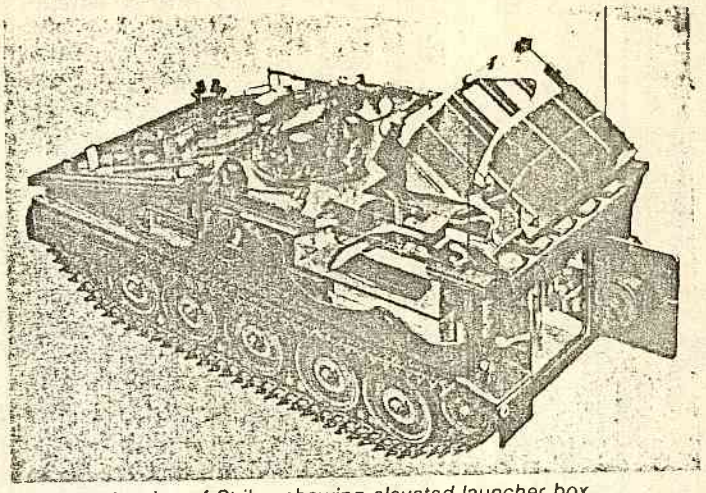
Belgian Scorpion fitted with Cockerill 90 mm gun



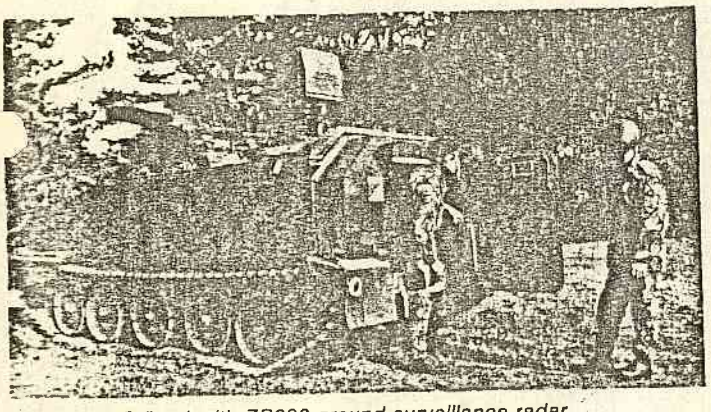
Scorpion with flotation screen erected



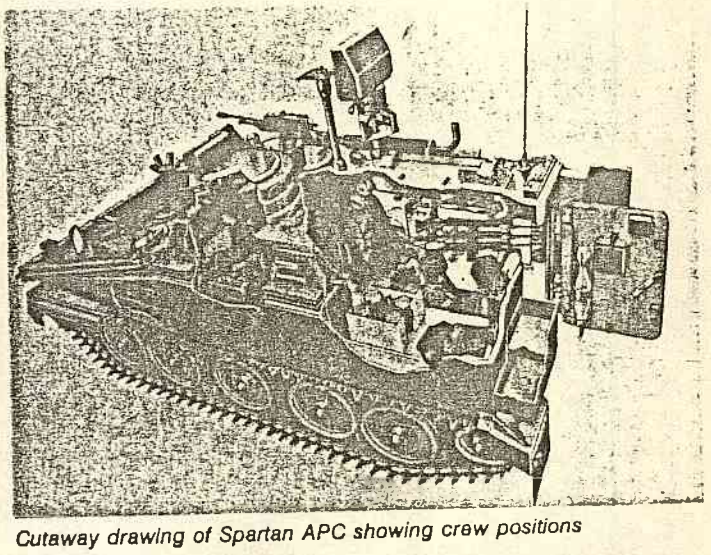
Belgian Striker launching British Aerospace Swingfire ATGW



Cutaway drawing of Striker showing elevated launcher box



Spartan APC fitted with ZB298 ground surveillance radar



Cutaway drawing of Spartan APC showing crew positions

The Striker is based on the hull of the Spartan APC with the driver at the front on the left, commander to the rear of the driver and the missile controller to the right of the commander. The commander has a No. 26 cupola (made by MEL) which has eight periscopes, monocular sight with a magnification of × 1 or × 10 with the line of sight elevating with the machine gun. The × 1 mirror assembly can be replaced by an image intensifier. Mounted on the right side of the cupola is a 7.62 mm machine gun which can be aimed and fired from within the vehicle and the cupola has a single-piece hatch cover that opens to the left.

The missile controller has a split-view monocular sight with magnification of × 1 and × 10 which can be traversed through 55 degrees left and right, and a single-piece hatch cover that opens to the right is provided to the rear of his sight.

On the roof at the rear of the vehicle is a launcher box with five British Aerospace Swingfire ATGWs. A further five missiles carried inside the vehicle are loaded manually and one of the crew has to leave the vehicle to accomplish this. The launcher box is pivoted at the rear and is elevated to an angle of about 40 degrees before the missiles are launched.

The Swingfire missile weighs 28 kg and has a HEAT warhead. Minimum range is between 150 and 300 metres depending on the distance of the vehicle and the controller when being used in the separated mode. Maximum range of the Swingfire is 4000 metres. An advantage of the Swingfire ATGW system over other systems is that the missiles can be launched from behind a crest or cover so that the launcher position cannot be seen by the enemy. The missiles can be launched by the controller in the vehicle, or with the controller at a vantage point (up to 100 metres from the launcher) separated from the launcher giving him protection from counter fire.

Mounted at the front of the vehicle are two four-barrel smoke dischargers which are operated from within the vehicle.

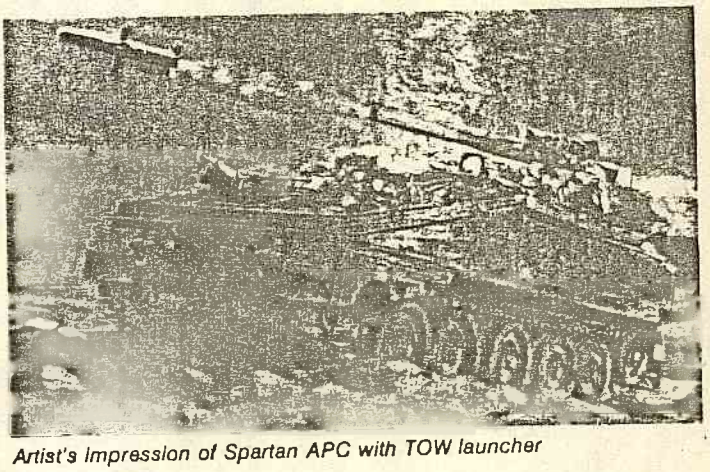
Spartan Armoured Personnel Carrier (FV103)

This entered service with the BAOR in 1978 and is used for a variety of roles such as carrying Royal Artillery Blowpipe SAM teams, missile resupply carrier for the Striker and for carrying Royal Engineer assault teams. It is not the replacement for the FV432 APC.

The Spartan has a similar hull to that of the Striker and can carry four infantrymen in addition to the driver, vehicle commander/gunner and section commander/radio operator.

The driver is seated at the front of the hull on the left and has a single-piece hatch cover that opens forwards. He is provided with a single wide-angle periscope which can be replaced with a passive periscope for night driving.

The vehicle commander/gunner is seated behind the driver and has a



Artist's impression of Spartan APC with TOW launcher

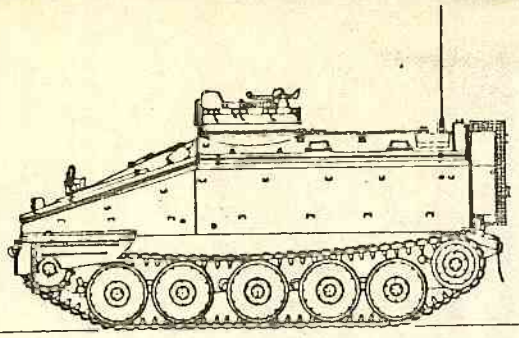
No. 16 cupola (made by MEL) with eight periscopes, monocular sight with a magnification of × 1 or × 10 with the line of sight elevating with the machine gun. The × 1 mirror assembly can be replaced by an image intensifier. Mounted on the right side of the cupola is a 7.62 mm machine gun which can be aimed and fired from inside the vehicle. The cupola has a single-piece hatch cover that opens to the left.

To the right of the commander/gunner is the section commander/radio operator who is provided with three observation periscopes and a single-piece hatch cover that opens to the right.

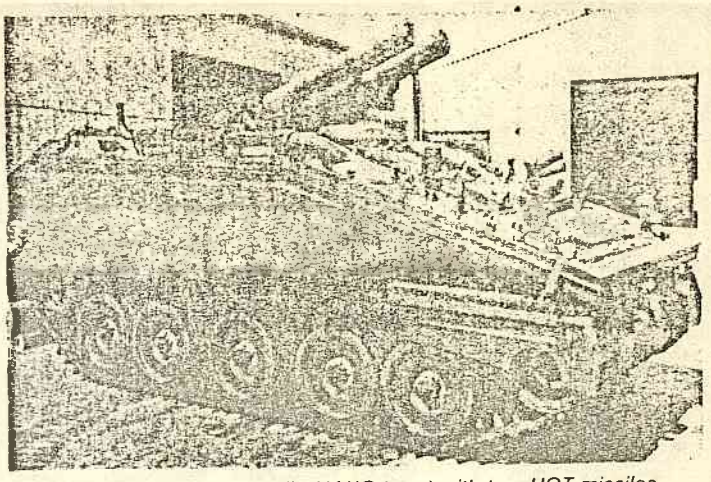
Entry to the personnel compartment at the rear of the vehicle is by a single door in the rear of the hull hinged on the right side, which has an integral vision block. Over the top of the troop compartment are two roof hatches that open either side of the vehicle. Two periscopes are provided in the left side and one in the right side of the troop compartment but there is no provision for the crew to fire their weapons from inside the vehicle. Three infantrymen are seated on the left side of the vehicle and a fourth to the rear of the vehicle commander/gunner and section commander/radio operator, facing the rear. A ZB298 ground surveillance radar can be mounted on the roof of the vehicle if required.

Spartan anti-aircraft vehicle

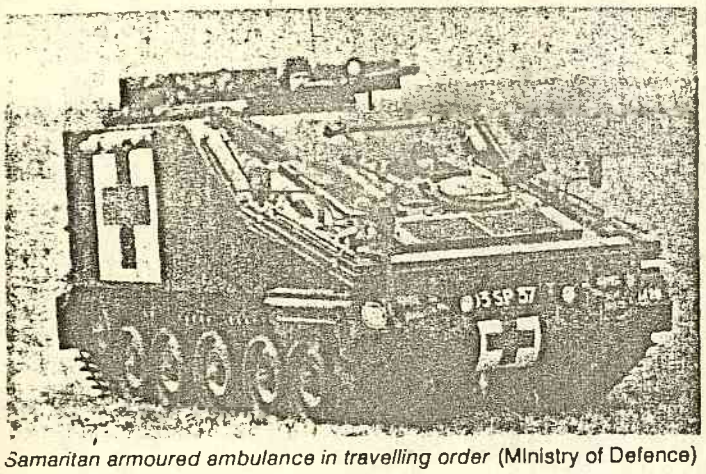
It has been proposed that the Spartan could be fitted with the French EMD TA 20 turret armed with twin 20 mm cannon, which has a depression of – 5



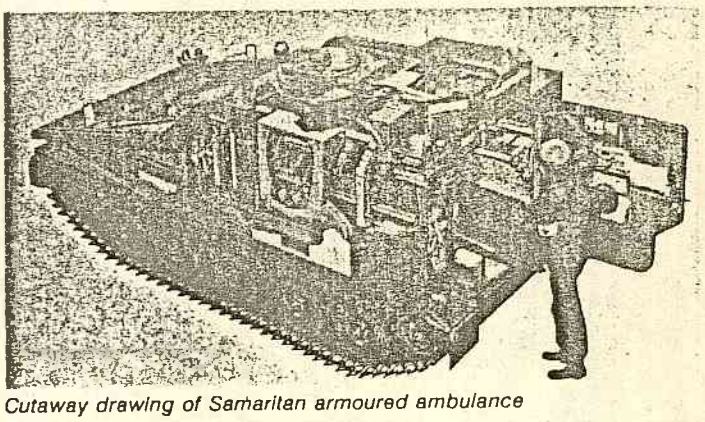
Spartan Armoured Personnel Carrier (FV103)



Spartan fitted with Euromissile HAKO turret with two HOT missiles

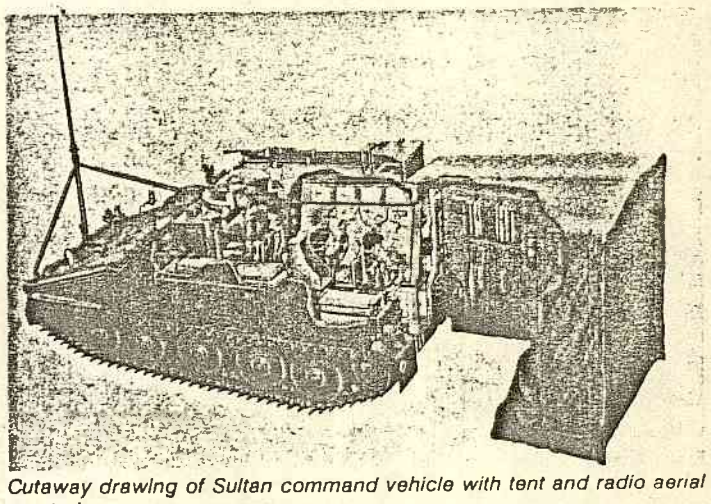


Samaritan armoured ambulance in travelling order (Ministry of Defence)



Cutaway drawing of Samaritan armoured ambulance

Sultan command vehicle in travelling order (Ministry of Defence)



Cutaway drawing of Sultan command vehicle with tent and radio aerial erected

degrees and an elevation of +85 degrees, turret traverse being 360 degrees. Elevation and traverse are both electro/hydraulic. Mounted on the rear of the turret is a pulse doppler radar with a maximum detection range of 8 km, which carries out surveillance of the surrounding air space, allocates targets to the weapons and supplies selected target trajectory characteristics to the fire-control computer. Details of this turret will be found in the *Turrets and cupolas* section.

Spartan with Hughes TOW ATGW System

In 1973 Alvis proposed that the Spartan could be fitted with a Hughes TOW launcher on the roof and carry nine missiles in the rear of the vehicle. A tripod is also carried enabling the missile to be used in the ground role.

Spartan with Euromissile HOT ATGW System

Euromissile and Alvis have carried out a feasability study which has shown that the Spartan can be fitted with both the Euromissile HAKO and UTM 800 turrets which launch the HOT missile. A prototype of the former was shown for the first time at the 1978 Farnborough Air Display. The HAKO turret has two missiles in the ready-to-launch position with the complete turret and two missiles weighing 270 kg. The UTM 400 turret has four missiles in the ready-to-launch position and weighs 800 kg with the four missiles. Full details of both these turrets are given in the *Turrets and cupolas* section.

Stretched Spartan APC

Shown for the first time at the British Army Equipment Exhibition held in June 1978 was a stretched APC which was developed by the Royal Ordnance Factory at Leeds and the Military Vehicles and Engineering Establishment. Available details are given in the *Armoured personnel carriers* section.

Samaritan Armoured Ambulance (FV104)

This model entered production early in 1978 and has the same hull as the Sultan command vehicle and has a crew of two: commander/medical orderly and driver. It is unarmed and can carry four stretcher cases, or five sitting cases, or two stretcher and three sitting cases. There is a large door at the rear of the hull, hinged on the right, with an integral vision block. The commander has five periscopes for all-round observation, plus a single wide-angle periscope with a forward-sloping window with an interchangeable passive night sight. The single-piece hatch cover opens to the left. Medical supplies can be carried on the top of the hull and at the rear of the vehicle.

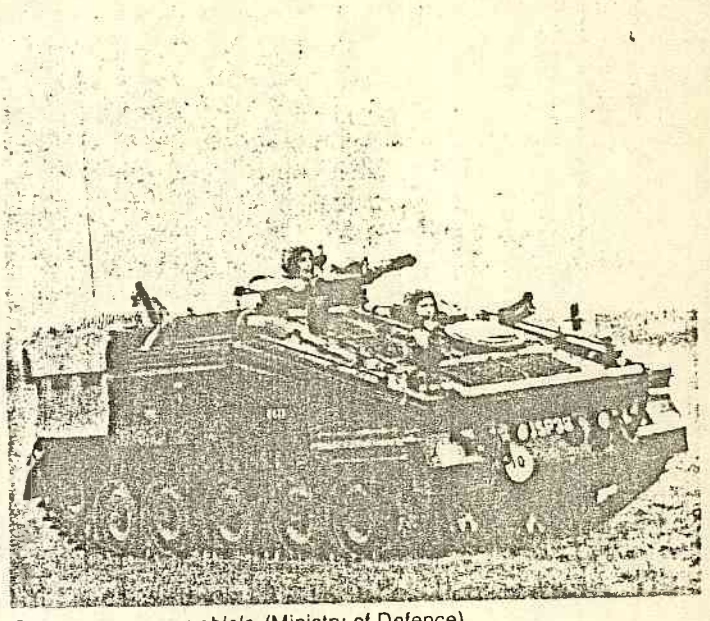
Sultan Armoured Command Vehicle (FV105)

First production Sultans were delivered to the British Army in April 1977 and are replacing the Saracen vehicles as command vehicles (eg FV604 and FV610). The vehicle has a similar hull to the Samaritan and has a crew of five or six: commander/radio operator, radio operator, driver plus two or three additional crew members. The command area is at the rear of the vehicle and to increase the amount of working space a tent can be quickly erected at the rear of the vehicle. The vehicle is normally equipped with at least two radios (one forwards and one rearwards), and mapboards. A radio aerial can be erected at the front of the vehicle when it is being used in the static role. The commander has five periscopes for all-round observation, plus a single wide-angle periscope with a forward-sloping window with an interchangeable passive night sight. The single-piece hatch cover opens to the left. Armament consists of a pintle-mounted 7.62 mm machine gun and four smoke dischargers mounted on either side of the vehicle towards the front.

Samson Armoured Recovery Vehicle (FV106)

This entered service with the British Army in 1978 and has a hull similar to that of the Spartan APC. The driver is seated at the front of the vehicle on the left and has a single-piece hatch cover that opens forwards and a single wide-angle periscope which can be replaced by a passive night periscope. The commander's No 27 cupola has a single wide-angle periscope which can be replaced with a passive night periscope, five periscopes for all-round observation plus a single-piece hatch cover that opens to the left.

The heavy-duty winch fitted inside the hull is driven from the main engine and has a variable speed of up to 122 metres a minute on the 229 metres of wire rope. Maximum pull, with a 4:1 snatch block, is 12 000 kg. The winch leads to the rear of the vehicle and when being used for recovery operations two spades are lowered manually at the rear of the vehicle. An A-frame can be erected at the rear of the hull. Tools, a bench, tow bars and tow cables are fitted as standard. Armament comprises a pintle-mounted 7.62 mm machine gun and four smoke dischargers mounted on either side of the vehicle towards the front.



Samson recovery vehicle (Ministry of Defence)

Scimitar Reconnaisance Vehicle (FV107)

The first prototype of the Scimitar was completed in July 1971 and accepted for service in June 1973. First deliveries were made to the British Army in March 1974 with first deliveries being made to the Belgian Army in April 1974. In the British Army, Scimitar is centralised in division armoured reconnaissance regiments but deploys to battalions in the division as their close reconnaissance force. It has the same hull and turret as the Scorpion but is armed with a 30 mm Rarden cannon instead of the 76 mm gun.

The 30 mm cannon was designed by the Royal Armament Research and Development Establishment at Fort Halstead and the Royal Small Arms Factory at Enfield. It fires all types of 30 mm Oerlikon ammunition as well as a number of British rounds developed specifically for it, including an APDS-T round. The latter will kill most light AFVs out to a range of 1000 metres and is also effective against the side armour of most MBTs. It can be used against soft targets up to a range of 2000 metres. Full details of the ammunition will be found in the *Ammunition* section but brief details are given below:

The gun is fired in rapid single shots but bursts of up to six rounds can be fired if required. The empty cartridge cases are automatically ejected outside the turret.

	British			Swiss			
TYPE	APDS-T	APSE-T	HE-T	PRAC-T	HE	AP	PRAC
Designation	n/av	L5A2	L8A2	L7A4	UIAT	RINT	ET
Weight of projectile	238 g	357 g	357 g	357 g	360 g	360 g	360 g
Weight of filling	n/av	29 g	25.6 g	26.5 g	25 g	n/app	n/app
Weight of cartridge case	365 g	365 g	365 g	365 g	350 g	350 g	350 g
Weight of complete round	879 g	904 g	904 g	904 g	870 g	870 g	870 g
Muzzle velocity	1200 m/s*	1070 m/s	1070 m/s	1070 m/s	1080 m/s	1080 m/s	1080 m/s

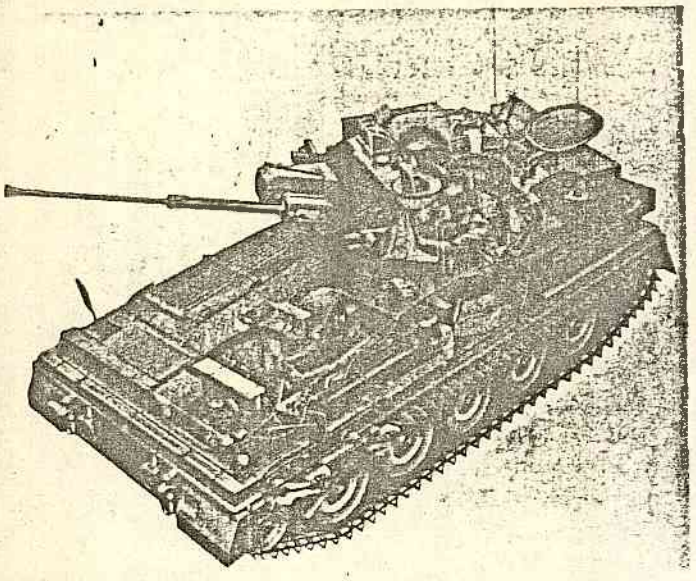
* approx

SPECIFICATIONS MODEL	Scorpion	Striker	Spartan	Samaritan	Sultan	Samson	Scimitar
DESIGNATION	FV101	FV102	FV103	FV104	FV105	FV106	FV107
CREW	3	3	3 + 4	2	5 – 6	3	3
COMBAT WEIGHT	7938 kg	8346 kg	8172 kg	8664 kg	8664 kg	8738 kg	7750 kg
POWER-TO-WEIGHT RATIO	23.93 bhp/tonne	22.76 bhp/tonne	23.25 bhp/tonne	21.92 bhp/tonne	21.92 bhp/tonne	21.74 bhp/tonne	24.51 bhp/tonne
GROUND PRESSURE	0.34 kg/cm²	0.345 kg/cm²	0.338 kg/cm²	0.358 kg/cm²	0.358 kg/cm²	0.358 kg/cm²	0.348 kg/cm²
LENGTH GUN FORWARDS	n/app	n/app	n/app	n/app	n/app	n/app	4.985 m
LENGTH HULL (inc stowage boxes where applicable)	4.572 m	4.826 m	4.930 m	5.067 m	4.8 m	4.788 m	4.572 m
WIDTH	2.235 m	2.242 m	2.242 m	2.242 m	2.242 m	2.430 m	2.242 m
WIDTH OVER TRACKS	2.134 m	2.134 m	2.134 m	2.134 m	2.134 m	2.134 m	2.134 m
HEIGHT OVERALL	2.102 m	2.21 m	2.26 m	2.416 m	2.559 m	2.254 m	2.096 m
GROUND CLEARANCE	0.356 m	0.356 m	0.356 m	0.356 m	0.356 m	0.356 m	0.356 m
TRACK	1.708 m	1.708 m	1.708 m	1.708 m	1.708 m	1.708 m	1.708 m
TRACK WIDTH	432 mm	432 mm	432 mm	432 mm	432 mm	432 mm	432 mm
NUMBER OF LINKS (per track)	79	82/84	84	84	84	84	79
MAX SPEED (road)	80.5 km/h	72.5 km/h	80.5 km/h	72.5 km/h	72.5 km/h	72.5 km/h	80.5 km/h
FUEL CAPACITY	423 litres	350 litres	386 litres	395 litres	395 litres	404 litres	423 litres
MAX RANGE (road)	644 km	483 km	483 km	483 km	483 km	483 km	644 km
FORDING	1.067 m	1.067 m	1.067 m	1.067 m	1.067 m	1.067 m	1.067 m
	all members of Scorpion family are amphibious with preparation						
FREEBOARD (forward with screen erected)	0.965 m	0.89 m	0.914 m	0.832 m	0.883 m	0.965 m	0.965 m
(aft with screen erected)	0.711 m	0.813 m	1.168 m	0.559 m	0.457 m	0.815 m	0.711 m
GRADIENT	60%	60%	60%	60%	60%	60%	60%
VERTICAL OBSTACLE	0.508 m	0.508 m	0.508 m	0.508 m	0.508 m	0.508 m	0.508 m
TRENCH	2.057 m	2.057 m	2.057 m	2.057 m	2.057 m	2.057 m	2.057 m
TURNING RADIUS	all members can pivot turn in neutral						
in 1st gear	1.71 m	1.84 m	1.84 m	1.84 m	1.84 m	1.84 m	1.71 m
in 7th gear	33.22 m	35.99 m	35.97 m	35.97 m	35.97 m	35.97 m	33.22 m
ENGINE	Jaguar 4.2 litre 6-cylinder petrol developing 190 hp at 4750 rpm						
TRANSMISSION	TN15X crossdrive, semi-automatic hot-shift type, providing 7 speeds in each direction and pivot turns						
STEERING	Merritt system incorporated in transmission						
SUSPENSION	torsion bar on all members of Scorpion family						
ELECTRICAL SYSTEM	28.5 V	28.5 V	28.5 V	28.5 V	28.5 V	28.5 V	28.5 V
BATTERIES	4	4	4	4	8	4	4
MAIN ARMAMENT	76 mm	Swingfire ATGWs	n/app	none	n/app	n/app	30 mm
MACHINE GUN	7.62 mm	7.62 mm	7.62 mm	none	7.62 mm	7.62 mm	7.62 mm
SMOKE DISCHARGERS	2 × 4	2 × 4	2 × 4	2 × 4	2 × 4	2 × 4	2 × 4
AMMUNITION (main)	40	10	n/app	none	n/app	n/app	165
(MG)	3000	3000	3000	none	2000	2000	3000
FIRE CONTROL SYSTEM	manual	n/app	n/app	none	n/app	n/app	manual
Gun elevation/depression	+ 35° – 10°	n/app	n/app	none	n/app	n/app	+ 35°/ – 10°

A 7.62 mm machine gun is mounted coaxially to the left of the main armament and four smoke dischargers are mounted either side of the front of the turret. The main armament, coaxial machine gun and smoke dischargers are electrically operated, with the main armament and coaxial machine gun having manual overriding control.

Status: In production. In service, or ordered by Belgium, Brunei, Honduras, Iran, Ireland, Kuwait, Nigeria, Tanzania, Thailand, Philippines, United Arab Emirates and the United Kingdom (Army and Air Force).

Manufacturer: Alvis Limited, Holyhead Road, West Midlands CV5 8JH, England.



Cutaway drawing of Scimitar armed with 30 mm Rarden cannon

Belgian Army Scimitar (Ministry of Defence)

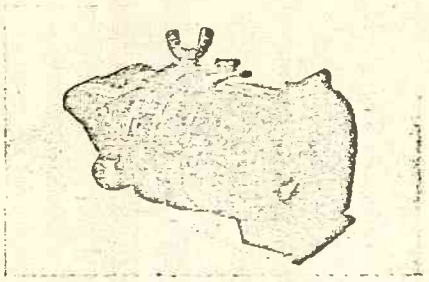
Tritium-activated light devices

Saunders-Roe Betalight self-powered light sources give continuous failure-proof illumination throughout their service life, which is well in excess of ten years, without the need for bulbs, batteries or power of any kind.

The Betalight is a borosilicate glass capsule internally coated with phosphor and filled with tritium gas which activitates the phosphor to emit light.

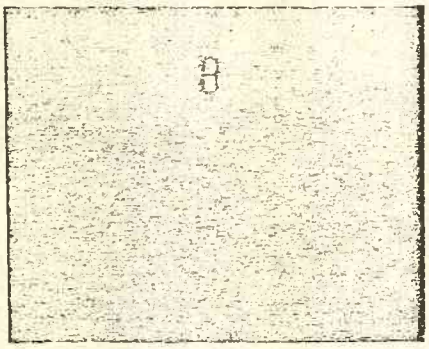
The Betalight has already been incorporated in a wide range of military equipment which includes optical sights, meters, compasses, manpack radio equipment and switches. In addition, Betalights are used to illuminate liquid crystal displays. The British Army and armies worldwide are using this self-contained source to illuminate equipment.

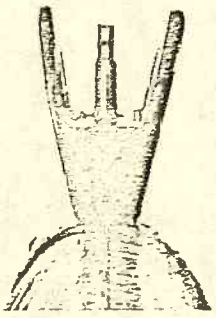
The Betalight conforms to the requirements of the British Ministry of Defence Standard DEF STAN 62-4.



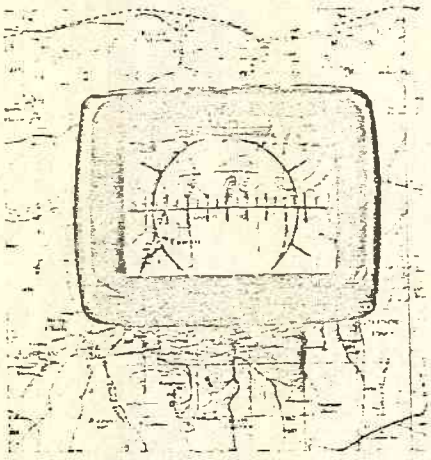
The Betalight self-luminous aiming post lamp has a range of up to 200 m

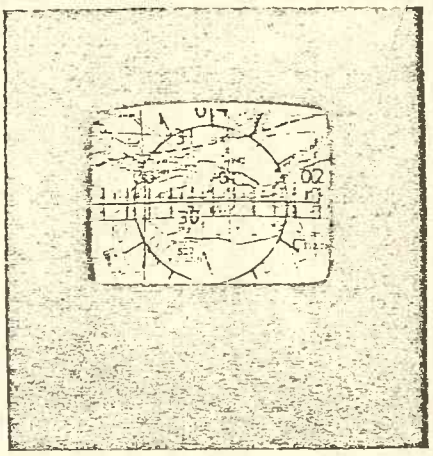
Betalight illuminated marker for attachment to clothing and equipment





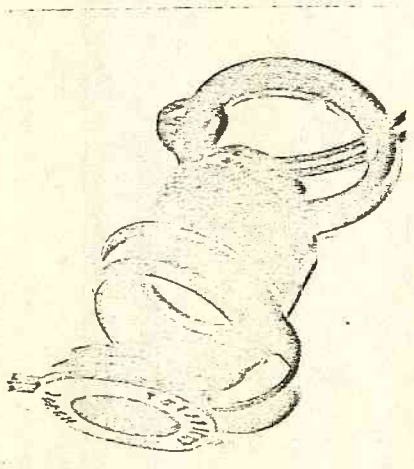
The Trilux rifle sight at night (left) and by day (right)





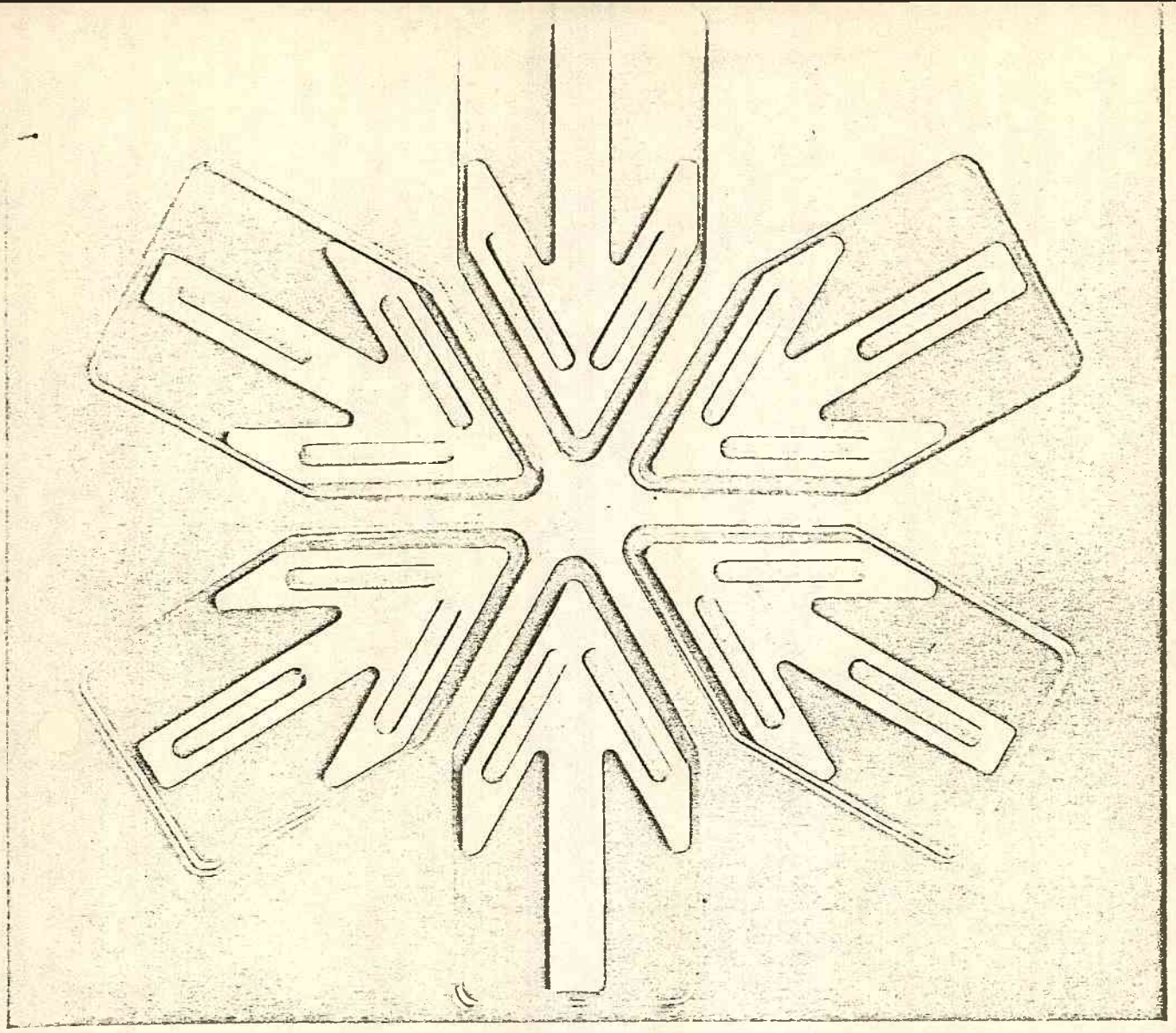
The Betalight map reader by day (left) and at night (right)

The Peglight can be hung from any support or hammered into any ground



The Betalight torch provides enough light for reading and has a life of up to ten years

The scales, level bubbles and graticule of this sight are lit by Betalights



The Saunders-Roe Betalight is incorporated in a range of standard equipment which includes the defile marker, route marker, Betalight torch, Peglight and map reader.

Illuminated defile and route markers

The Saunders-Roe defile and route markers are compact, robust, self-illuminated markers which have been developed to permit rapid and reliable marking of routes, bridges and minefields.

The lightweight self-illuminated markers are designed to withstand all climatic and operational conditions met by the modern soldier.

The markers have rotating arrow heads which locate at 45 deg intervals and a universal mounting bracket which allows easy fixing to standard military marking poles, pickets, nails, wires, trees or other supports. The design allows up to 12 markers to be carried in a standard NATO 7·62 mm ammunition box (type H8A Mk 1 SV479A).

Illuminated Peglight

The Saunders-Roe Peglight is a forward area covert marker. It is basically an illuminated peg which can be driven into hard ground. timber or tarmac and used to identify cleared paths through minefields, location positions for weapons and infantry arc of fire.

The design is centred around the Saunders-Roe Betalight which is visible through a series of holes in one side and top of the Peglight. The unit incorporates a spring clip and ring for easy fixing to webbing, trees, nails and wire, etc.

Illuminated torch

The Saunders-Roe Betalight illuminated torch is a completely self-powered unit which requires no wiring or battery. The light output is sufficient to illuminate an area half the size of this page, without affecting night vision, while the recessed light source reduces the chance of enemy detection.

The compact, robust, black rubber housing of the Betalight torch is produced with a ring and cord for ease of handling. The hinged front cover can be used to obscure the light to ensure maximum security in forward areas.

Illuminated map reader

This single unit includes both magnifier and Betalight illumination for the reading of maps and charts by day and night.

A Westland Company

SAUNDERS-ROE DEVELOPMENTS LIMITED

Millington Road, Hayes, Middlesex, Great Britain, UB3 4NB

Telephone: 01-573 3800 Cables: Saro Hayes Telex: 934515

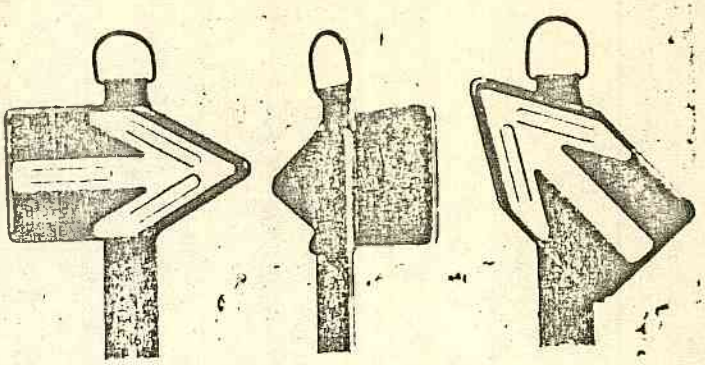
SRDL

BETALIGHT ILLUMINATED DEFILE MARKER

Originally developed for use on the Medium Girder Bridge (MGB – made by Fairey) this self luminous member is also suitable for minefield marking and similar purposes. It is a robust soldier-proof device which will retain its luminous properties for some 15-20 years. The plate carrying the luminous arrow is mounted on the body of the device so that it can be widened to any of eight positions at 45 degree intervals. The arrow is clearly visible by day and by night and in starlight conditions it can be seen at a distance of 100 metres.

The body is designed to be clipped on British Military Police mounting poles or other narrow supports, attached by screw to wood or threaded metal or suspended by its loop from any convenient projection. 12 markers can be carried in a standard 7.62mm ammunition box.

Manufacturer: Saunders-Roe Developments Ltd, Millington Road, Hayes, Middlesex UB3 4NB
Status: Current. In production



SRDL Betalight defile markers

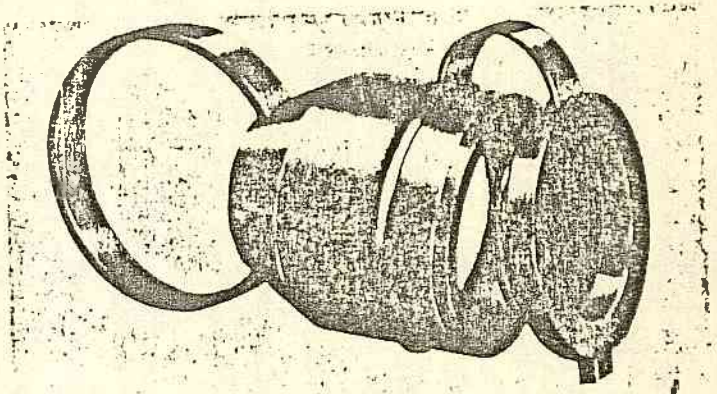
Service: British forces and some foreign armies in Middle and Far East

SRDL BETALIGHT TORCH

Another SRDL Betalight device is a small pocket torch which gives enough light to read a map or the graduations on fuses and sights yet is small enough to be easily concealed without encumbering the user. A ring at the rear of the torch is attached to a neck-cord.

The torch is robustly made and housed in a black rubber moulding. It has a detachable front cover which obscures the light when the torch is not in use.

Manufacturer: Saunders-Roe Developments Ltd, Millington Road, Hayes, Middlesex UB3 4NB
Status: Current. In production
Service: British Army



SRDL Betalight torch

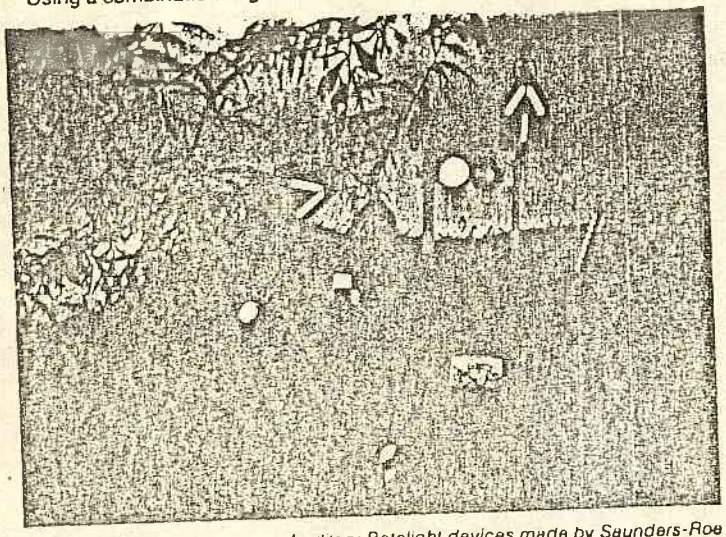
SRDL AIMING POST LAMP

These aiming post lamps, which are in widespread service, are designed to be used to align mortars or artillery weapons during night firing. Their advantage over earlier types of aiming post lamp is that the Betalight source used is self-powered and reliable and weighs very little.

The lamps are supplied with either green or orange illumination and standard displays include a cross, a bar and an arrow. The lamps, which are small and light enough to be carried in the pocket, are designed to clamp on either square or round posts.

Using a combination of green and orange lamps it is possible to set up a series of mortars by planting a lamp to the front and rear of each. By using a C2 or similar sight each mortar can then be accurately aligned. By alternating orange and green lamps in both front and rear rows confusion between own and adjoining mortar lamps can be avoided.

Although designed primarily for weapon aiming, the lamp can be used for many other purposes either as a routine or in an emergency. Possible applications include route marking, map reading and minefield marking and the lamp can be used as a torch for close work or as a convoy tailboard lamp.

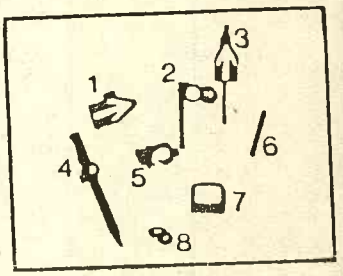


This illustration shows a range of military Betalight devices made by Saunders-Roe Developments and now in widespread use. The aiming post lamp and the defile marker (separately described) are seen; so is the necklight – a shielded continuously-operating torch which gives ample light for map-reading or for the adjustment of apparatus. The various devices are listed opposite and can be identified on the accompanying key.

DATA
Length: 72mm or 75mm including mask
Width: 70mm including clamp
Diameter: 45mm
Clamping range: Round or square section posts from 13mm to 38mm diameter
Weight: 230g complete
Normal working range: Up to 200m
Angle of view: 7.5° standard, 45° version available
Operating temperature: −60 to +70°C

Manufacturer: Saunders-Roe Developments Ltd, Millington Road, Hayes, Middlesex UB3 4NB
Status: Current. In production
Service: British Army and many foreign armies. Standard equipment with the L16 81mm mortar

1. *Defile marker.*
2. *Aiming post lamp.*
3. *Betalight illuminated route marker.*
4. *SRDL Necklight self-powered torch.*
5. *Mortar sight illuminated by Betalights.*
6. *Illuminated peg light.*
7. *Map reader illuminated by Betalights.*
8. *SRDL Necklight.*



TRADUCCION - APENDICE

LUCES SIN POTENCIA.

Dispositivo de luz activada de Tritium

Estas fuentes de luz dan una contínua iluminación a prueba de fallas a traves de su vida en servicio, la cual es de 10 años, sin la necesidad de lámparas, baterías o potencia de ningún tipo.

El Betalight es una cápsula de vidrio de borosilicato cubierta internamente con fósforo y llenada con gas de tritro el cual activa el fósforo para emitir la luz.
Se usa para equipos militares como miras ópticas, metros, compases, equipos de radio e interruptores, ademas para iluminar l los displays de cristales líquidos.

La armada Británica y otras armadas usan esta fuente para iluminar el equipamiento.

Haces iluminados y marcadores de ruta:

Los haces y marcadores de ruta Sanders-Roc son compactos, marcadores semi iluminados los cuales han sido producidos para permitir marcas confiables y rápidas de rutas, puentes y campos de minas.

Los marcadores livianos semi iluminados se diseñaron operacionales. Tienen cabezas rotativas que localizan a intervalos de 45 grados y un soporte montante universal que permite una fácil fijación en palos de marca Standard, cables, árboles y otros soportes. El diseño permite llevar más de 12 marcadores en una caja de munición standard de la NATO de 7,62 mm.

Espiga de luz iluminada (PEGLIGHT) Es un marcador para áreas adelantadas. Es básicamente una espiga de luz la cual puede ser clavada en tierra dura o madera y usada para identificar claros de senderos en campos de minas y posiciones de armas enemigas.

Antorcha iluminada

Es una unidad completamente de semi potencia que no requiere encablado o batería. La salida de luz es suficiente para iluminar la mitad de un área de esta página, sin afectar la visión nocturna, mientras que la fuente de luz suspendida reuce la chance de detección del enemigo.
El alojamiento compacto y de goma negra está hecho con un aro y un cordón para su fácil manejo
La cubierta frontal puede ser usada para oscurecer la luz para asegurar un máximo de seguridad en áreas adelantadas proximas

Lectura de mapa iluminado

Esta unidad simple incluye un vidrio de aumento e iluminación de Betalight para lectura de mapas y cartas de día y de noche

TRADUCCION - APENDICE

BINOCULARES GIRO-ESTABILIZADOS

Para vigilancia e identificación de blancos: (Tipo GS 907)

El tipo GS 907 es una mira de mano giro-estabilizada, simple para operar y diseñada para evitar la imagen borrosa causada por el temblor de la mano y la vibración cuando se usan binoculares en superficies móviles. Es un instrumento monocular que se parece a los binoculares convencionales. Tiene dos oculares, uno de los cuales está en blanco. Tiene un protector flexible que puede ser invertido para permitir al usuario operar el instrumento con el ojo derecho o izquierdo. Fue diseñado con un aumento de x7 y un campo visual de 7.4 grados, ofreniendo el mejor compromiso óptico

Proporciona una visión clara al observador desde una plataforma movible y mejor visión cuando se está en suelo firme. Es un dispositivo confiable que proporciona una ayuda efectiva para supervivencia, reconocimiento e identificación en roles militares, de contra insurgencia, civiles, tales como busqueda y rescate. La estabilización se cumple por medio de un espejo gimbal que es controlado por un giróscopo manejado por una batería.
A ese equipo puede ser sostenido en cualquier actitud; el usuario no requiere ningún soporte fijo. Tiene un dispósitivo de dirección interno que provee un seguimiento efectivo. El giróscopo se enciende presionando el interruptor on/off. Para estabilización, se presiona otro botón y se sostiene para librar el giro y estabilizar el espejo; cuando se suelta, este botón aprisiona los gimbales del giróscopo. Este equipo está en uso en las fuerzas armadas inglesas y de otros 15 países.

Apêndice 42

Raiding craft

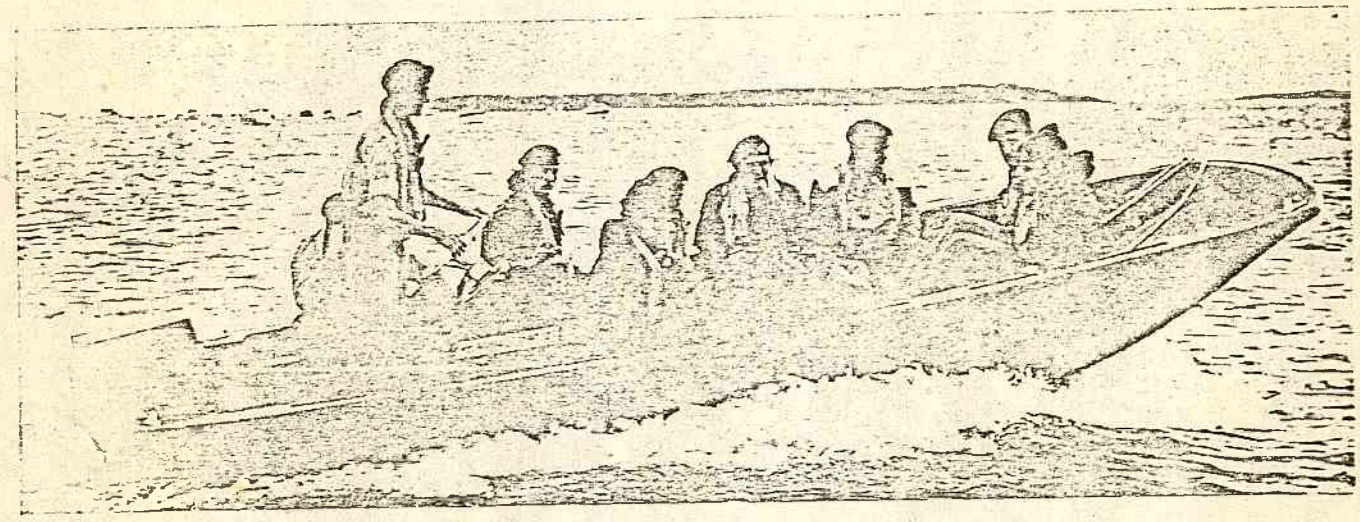
with rigid moulded high-speed hull

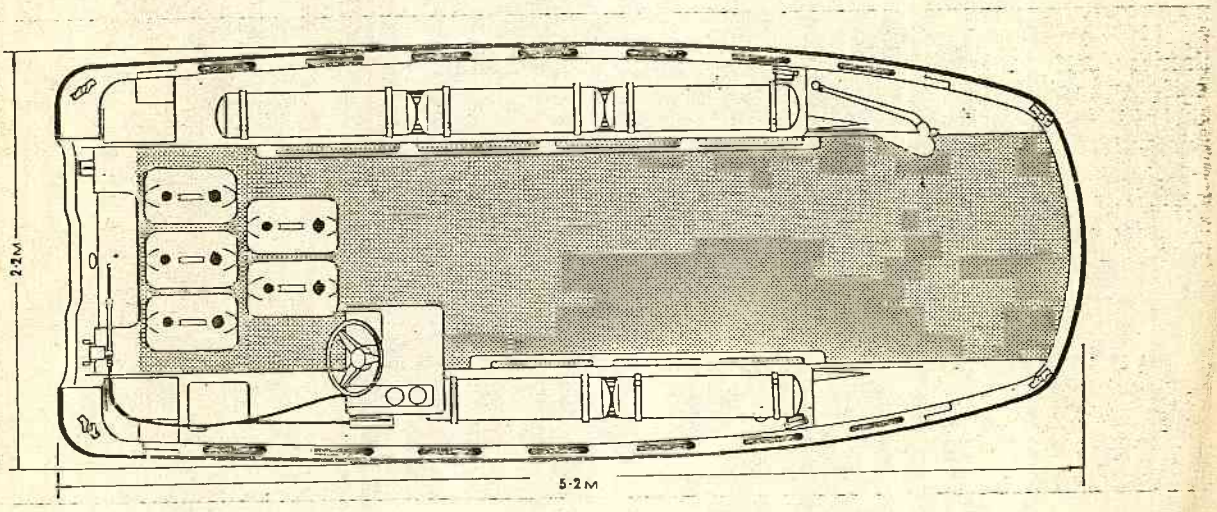
These 5·2 m (17 ft) craft are an adaptation of the standard Dory 17 hull with a completely redesigned interior featuring seating for nine armed men and a cox and a ramp bow for easy loading and disembarkation. There is clear stowage space in the centre and seating on inflated rollers along each side.

The boats are specially designed to nest and can be stacked four or even five high. They are excellent surf boats and very easy to handle. Being foam-filled, they are quite unsinkable, even when heavily damaged. The built-in hull buoyancy can support in excess of 800 kg (1800 lb) when the boat is submerged.

Speed varies according to the horsepower of the outboard. The Royal Marines fit a single 135 hp Johnson which gives well over 56 km/h (30 knots) in the light condition, and over 37 km/h (20 knots) fully loaded. Various other combinations, either single or twin, can also give very satisfactory results.

There are a number of uses for such a boat, but it is particularly suited to tasks requiring high speed and large load-carrying capacity, such as the transport of stores and equipment, troops and passengers, and for beach assault, rescue and diving work.





Dimensions
Length: 5·2 m (17 ft 1 in)
Beam: 2·2 m (7 ft 1 in)
Height: 1·1 m (3 ft 8 in)
Weight: 590 kg (1300 lb)
Height, three-stacked: 1·4 m (4 ft 5 in)

Performance
Maximum operating speed: 65 km/h (35 knots)
Maximum carrying capacity: 10 persons plus equipment or 900 kg (2000 lb)

Suitable motors: single or twin combination motors ranging from minimum 40 hp single to maximum 135 hp single or 2 × 65 hp. All motors longshaft
Fuel capacity: 5 × 23 litres (5 × 5 gal) standard tanks
Buoyancy: approximately 1·4 m³ (50 ft³) expanded polyurethane buoyancy material is built into the boat, giving a nett reserve buoyancy of 900 kg (2000 lb)

Construction
GRP/foam/GRP sandwich

WADHAM STRINGER (DELL QUAY) LTD
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Great Britain, PO10 8PE
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